# 

AUTOMOTIVE and AVIATION MANUFACTURING ENGINEERING • PRODUCTION • MANAGEMENT

NOVEMBER 1, 1956

In This Issue

Producing the TorqueFlite Transmission Latest Czech Designs at Brno Exhibition New GMC, Studebaker, and Dodge Trucks

Buick, Chrysler, De Soto, Dodge, Imperial, Mercury, Nash, Oldsmobile, Plymouth, Pontiac, and Studebaker Passenger Cars for 1957

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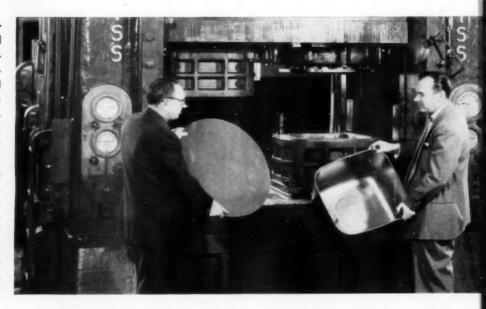
A CHILTON PUBLICATION



# "We have no operating problems when we use STANOIL Industrial Oil"

Midwest Metal Stamping reports results of 8 years of press operation using STANOIL

Don Foster, Midwest Stamping Purchasing Agent and Jesse Nelson (right), Standard Oil industrial lubrication specialist, display metal blank and finished tub turned out on Bliss press. Technical service on lubrication problems is Jesse Nelson's job. He's been doing such work for seven years. Jesse has an engineering degree from the University of lowa and is a graduate of the Standard Oil Sales Engineering School. Customers find this experience and training pay off for them.





Stamping being removed from press by operator George Johnson. Press has used STANOIL Industrial Oil as hydraulic medium for eight years. Oil has perfect performance record. In 1948, Midwest Metal Stamping Company, Kellogg, Iowa, put into service a Bliss Hydro Dynamic Press. Stanoil Industrial Oil was selected as the hydraulic medium. The initial fill was 1,400 gallons. The press operated continuously from 1948 until Christmas, 1954, when it was shut down five days for overhaul.

At the time of overhaul, the STANOIL Industrial Oil was drained. And here STANOIL's superior demulsibility was demonstrated. Due to the high rate of condensation, two barrels of water were removed from oil

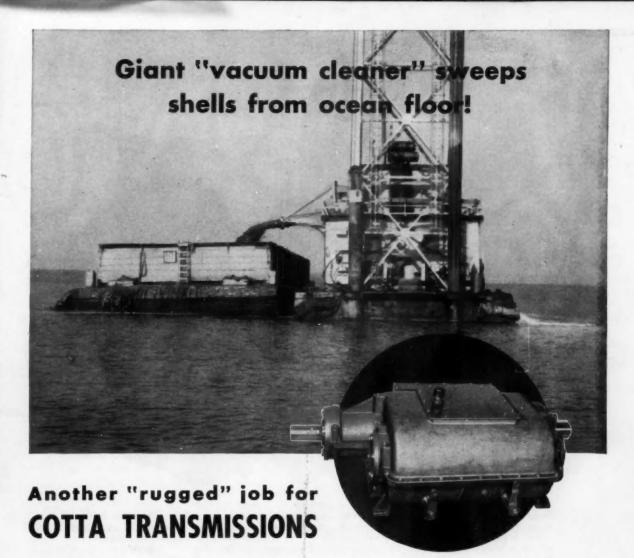
reservoir. An oil analysis in the Standard Oil laboratory proved the oil still suitable for continued service. After filtration, it was returned to the reservoir and the press put back in operation. Stanoil continues to deliver the same perfect performance for Midwest as before.

stanoil Industrial Oil can perform just as efficiently for you. Find out. There is a Standard Oil industrial lubrication specialist near you in any one of the Midwest and Rocky Mountain states. Call him. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

STANDARD OIL COMPANY

(Indiana)





Here's how Cotta Transmissions are used with modern Diesel engines.

Cotta's Model GNR Reduction Gear is used between a 400 hp engine and dredge pump... replacing a Diesel-electric drive... modernizing and speeding operation of the dredge used for pumping oyster shells out of San Francisco Bay for the manufacture of cement.

For continuous heavy-duty operation and power

transmission jobs ordinary gear boxes can't handle — requiring Single Speed Reduction Units or Multi-Speed forward and reverse — come to Cotta for "engineered-to-order" transmissions, designed to fit available space. Thousands in operation throughout the United States and foreign countries . . . on a wide variety of jobs . . . (on cranes, locomotives, drillers, shovels, etc.) . . . under all types of tough conditions. Input torque from 150 to 2500 ft. lbs.

### THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions, and complete specifications sent free on request. Just state your problem—COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS





Resistant to heat, shock, wear and galling . . . these nickel cast iron brake drums provide, in addition, extra strength due to their ribbed offset shape. And the flange rim prevents stretch-

ing of the outer periphery. Increased braking surface lowers pressure per square inch, resulting in cooler, safer operation. Designed and produced by Utility Mfg. Co., Los Angeles, Calif.

# Nickel cast iron makes good drums better! Last longer...cut operating and maintenance costs

No problem with fade, overheat, or "bell mouthing" when you use Utility brake drums.

#### **Resists Heat Checking and Distortion:**

Utility drums are made of a carefully controlled nickel-molybdenum cast iron to retard heat checking and resist distortion, no matter how long or steep the grade. Specifying 1.75% of nickel assures high strength in an iron able to withstand the intense heat generated on the braking surface.

As a result, users find brake drum life lengthened, while operating and maintenance costs go down sharply.

#### **Nickel Prolongs Operating Life**

This is only one of countless examples, showing how the engineering properties of cast iron may be controlled to meet specific needs by use of nickel... either alone or along with other alloying elements.

#### If You Have Metal Problems . . .

If you need special combinations of properties... or if machining or heat-treating is a problem... we may be able to help you select exactly the right material to meet your needs. Send us details of your difficulty for our suggestions.



THE INTERNATIONAL NICKEL COMPANY, INC. No. WY WORK S. W.Y.

# RUTOMOTIVELINDUSTRIES

NOVEMBER 1, 1956

VOL. 115, NO. 9

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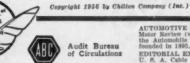
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As part of its worldwide automotive and aviation news coverage, AUTOMOTIVE INDUSTRIES is serviced by International News Service and has editorial correspondents in major United States and foreign industrial centers.

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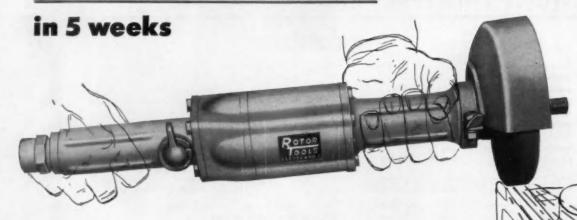
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# **DOUBLES OUTPUT**

New Rotor D-6 Air Grinder pays for itself



JOB: Removing flash and parting lines from steel castings. Tool used 50% of production time.

FORMERLY: Used 6" electric grinders at 3700 rpm. Required 10 minutes per casting.

NOW: Using New Rotor D-6 Air Grinders at 6000 rpm. Job time cut to 5 minutes.

**RESULTS:** Output doubled. Savings paid for new Rotor Grinder in 5 weeks. Wheels last longer. Tool is 5 lbs. lighter, easier to handle.

A demonstration on your work will show how you can improve production with these new Rotor Grinders. Ask for proof.

#### SPECIFICATIONS FOR ROTOR D-6

RPM	WHE	EL SIZE	LENGTHA	WEIGHT		
KFM	Elastic	Vitrified	LENGTH	WEIGHT		
6000	6"	4"	221/4	91/4		
4500	8"	5"	221/4	91/4		
4100	8"	5"	221/4	91/4		

\* For D-6S straight handle. Add ¾ lb. for D-6G grip handle. † Deduct 11/4" for grip handle.



ASK FOR BULLETIN 44

THE ROTOR TOOL CO.

CLEVELAND, OHIO

THE PERSON ANALYSIS OF PORTABLE TOOL PROPERMS

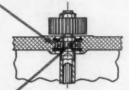
HIGH

# 4 Waldes Truarc Rings Cut Costs Drastically, Increase Versatility of Precision Automatic Drill

## **Dumore's New Automatic Drill**

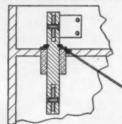
**Dumore Precision Tools, Racine,** Wisconsin, uses 4 Waldes Truorc Retaining Rings in their versatile new automatic drill unit. Machining operations have been eliminated, assembly simplified. Great labor savings have resulted from use of Truarc rings.



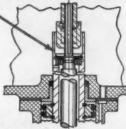


Bearing it held in position by two Waldes Truarc Rings— Standard (Series 5000) and Bowed (Series 5001). Two greates are turned and housing rough bored in one operation. Alternate method would require at least two additional machining operations. Bowed Truarc ring takes up accumulated talerances resiliently.

## **Actuator Lever Shaft Assembly**



A Single Waldes Truarc External Retaining Ring (Series 5100) acts as shoulder, holds the lever in position. Labor replaces turning a shoulder, grinding and polishing. **Piston Assembly** 



Easy assembly is assured by use of one Waldes Truare Bowed Ring (Series 5001) to lock the bearing to the piston assembly. When unit is to be used in tapping applications, entire spindle assembly can be removed without disassembly.

Whatever you make, there's a Waldes Truarc Retaining Ring designed to improve your product...to save you material, machining and labor costs. They're quick and easy to assemble and disassemble, and they do a better job of holding parts together. Truarc rings are precision engineered and precision made, quality controlled from raw material to finished ring.

36 functionally different types...as many as 97

different sizes within a type...5 metal specifications and 14 different finishes. Truarc rings are available from 90 stocking points throughout the U.S.A. and Canada.

More than 30 engineering-minded factory representatives and 700 field men are available to you on call. Send us your blueprints today...let our Truarc engineers help you solve design, assembly and production problems... without obligation.

For precision internal grooving and undercutting . . . Waldes Truarc Grooving Tool!

Send for new catalog supplement



WALDES

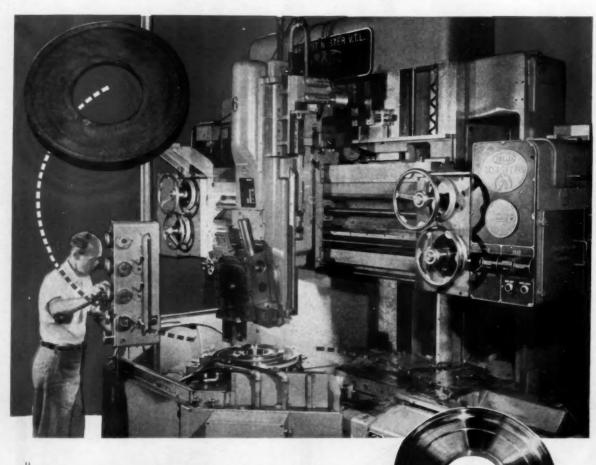
RETAINING RINGS

Waldes Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, H.Y. Please send the new supplement No. 1 which brings Truerc Catalog RR 9-52 up to date. (Please print)

Company.

Zone ... State

WALDES TRUARC Retaining Rings, Grooving Tools, Pliers, Applicators and Dispensers are protected by one or more of the following U. S. Patents: 2,382,948; 2,411,426; 2,411,761; 2,416,852; 2,420,921; 2,428,341; 2,498,785; 2,441,846; 2,455,185; 2,483,379; 2,483,380; 2,487,802; 2,487,903; 2,491,3306; 2,491,3310; 2,599,081; 2,544,631; 2,544,631; 2,547,632; 2,547,632; 2,558,704; 2,574,034; 2,577,319; 2,559,787, and other U. S. Patents pending. Equal patent protection established in foreign countries.



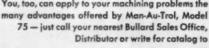
To produce quality parts in quantity . . .

# Nothing beats Man·Au·Trol

This statement by Mr. W. Mason Williams, Manufacturing Manager of the Jet Division, Thompson Products Inc., Cleveland, Ohio, is based on ten years of experience with Man-Au-Trol.

"If it hadn't been for Man-Au-Trol" Mr. Williams continues, "we would still be turning out aircraft engine components on manually-operated machines. Man-Au-Trol, particularly when tooled with better cutting tools, has enabled us to turn out at least five times as many compressor disc and turbine discs per shift as we produced on hand-operated equipment."

You, too, can apply to your machining problems the



# THE BULLARD COMPANY

BRIDGEPORT 9, CONNECTICUT

BULLARD

whether you think in terms of

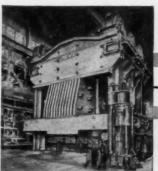


The crankshaft is the backbone of the pistontype engine. Illustrated above is the crankshaft forging for the most powerful piston-type aircraft engine ever produced.

# Horsepower

01

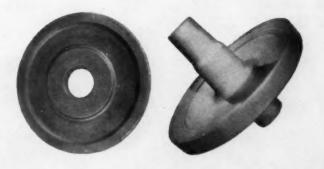




# Thrust

The history of Wyman-Gordon's contribution to aircraft progress dates from the inception of the "flying machine". The jet age is now calling on the unparalleled resources of Wyman-Gordon, which include the widest range of hammer and press equipment and the greatest technical know-how in the industry. Larger and more intricate forgings than heretofore available of aluminum and magnesium are being produced on presses up to 50,000 ton capacity, and giant hammers are fulfilling the growing need for forgings of titanium, high density materials or so-called super alloys. Now, as for nearly 75 years, there is no substitute for Wyman-Gordon experience and ability for - Keeping Ahead of Progress.

At the bottom left is a turbine disc forging made from high density heat resisting alloy, and next to it is a titanium compressor wheel forging for two of the most powerful jet engines yet produced.



# WYMAN-GORDON COMPANY

Established 1883 -

FORGINGS OF ALUMINUM . MAGNESIUM . STEEL . TITANIUM

WORCESTER I, MASSACHUSETTS

HARVEY, ILLINOIS . DETROIT, MICHIGAN

# B.F.Goodrich Chemical raw materials



PLUG VALVE of Geon for bandling corrosive fluids demonstrates molding of complicated shapes with integral threads. At the bearing surfaces Geon is molded to another plastic.

# LOOK WHAT THEY'RE MOLDING IN GEON RIGID VINYL...

All parts shown made by Tube Turns Plastics, Inc.

Geon polyvinyl chloride rigid compounds are recognized as outstanding materials for piping and fittings. Geon offers high impact and tensile strength, and superior resistance to oils, acids, alkalis, and most chemicals.

These same rigid compounds are being molded into many complicated shapes and parts in addition to piping components. Geon can be used in designs utilizing very thin sidewalls as well as heavy sections. Holes, studs, and threads can be made integrally. Parts weighing several pounds can be molded in one shot.

Despite design complexity, check Geon for strong, light,

corrosion-resistant parts. For booklet on properties of rigid Geon compounds 8700 A and 8750, write Dept. DA-6, B. F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ont.



B.F.Goodrich Chemical Company a division of The B.F.Goodrich Company



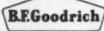
BIG FELLOWS include piping tee and motor housing, requiring heavy cross section, chemical inertness, dimensional stability. By contrast, molding for automobile dashboard has thin section, large projected area.



ELECTRICAL PARTS include fractional horsepower motor housing which reduces appliance weight, and hanger hand fortransformer with Geon motoled around metal holt. Geon has excellent dielectric properties.



AUTO HORN trumpet shows complicated contours possible in rigid Geon. Note very thin walls obtained in this high-impact material. Photos courtesy Tube Turns Plastics, Iuc., Louisville, Ky.



B.F.Goodrich / GEON polyvinyl materials - HYCAR American rubber and latex - GOOD-RITE chemicals and plasticizers - HARMON colors

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PRESSES

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Get Better Production Balance, Easier Automation, Faster Installation

New Danly presses stand up to full capacity operation, single shift or around-the-clock, with minimum down-time...you get the performance you plan on. No more "production pile-up" with presses producing at less than full capacity or shut down entirely. Controls are "built-in" for convenient floor level adjustment, ideal for automation, designed for maximum safety.

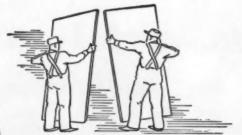
Each press is delivered pretested and ready to go...saving weeks of costly erection time.

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DANLY MACHINE SPECIALTIES, INC. 2100 S. Laramie Ave., Chicago 50, Ill.





# Have you a similar fastening problem?

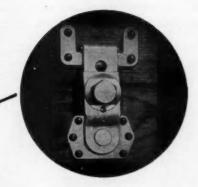
How a strong structure can be designed for speedy and simple assembly with unskilled labor, no special tools...



The U. S. Air Force wanted a jet-aircraft hangar design that would be portable by air, yet strong; would assemble quickly; be interchangeable, and flexible enough for easy structure modification.

The answer lay in a panel structure using modular units. Armorphy honeycomb panels faced with thin aluminum, developed by United States Phywood Corporation, provide lightness, strength, flexibility. Joining one panel to the other in the field with untrained help was a problem until Simmons Fastener developed LINK-LOCK, a simple latching device that operates with minimum wrench pressure on hex nut.

This fastening problem is being successfully met by combining the design ingenuity of No. 1 LINK-LOCK with the proved performance of honeycomb plywood panels.



No. 1 LINK-LOCK-like No. 2 LINK-LOCK-features simplicity, positive action, high strength.

No springs are used in No. 1 LINK-LOCK. Locking action is obtained by rotating a nut that moves a sliding latch in and out of position. Up to 1500-lb. pull-down pressure is available; the device carries up to 4000-lb. tension. No. 1 LINK-LOCKS provide for surface mounting, simplifying installation.

Where can you use it? When you need heavy fastening pressures, resistance to impact, operation in 70-below temperatures—and where ease of action, compactness, and low cost are important factors. Write for a No. 1 LINK-LOCK Data Sheet.

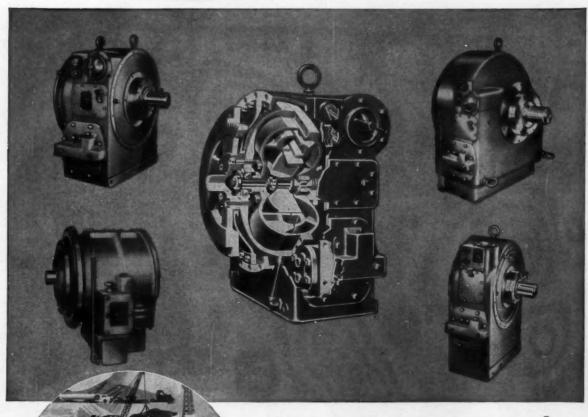
SIMMONS FASTENER CORPORATION

1749 North Broadway, Albany 1, New York

Simmons

QUICK-LOCK SPRING-LOCK ROTO-LOCK LINK-LOCK DUAL-LOCK

JUST OUT! NEW 36-PAGE CATALOG WITH APPLICATIONS. SEND FOR IT!



# For your power need, whatever it is, there's a "right"

# TORCON Model

With a horsepower range from 15 to 600, and fly-wheel diameters from 11 to 26 inches, Torcon has a model that's right for your need—a standard unit available immediately for original equipment or for field installation.

Your real benefits begin after Torcon is installed-

- more work and less wear: Torcon blade design balances engine efficiency and horsepower through the working range—smooth, shockless power that reduces wear, prolongs life
- integral unit includes oil pump, sump, pressure regulator; much better efficiency with minimum maintenance

Are you constantly on the look-out for ways to get more efficient power at less cost? Talk to Clark—on all problems of power transmission, from flywheel to point of torque application. You'll find, as do many leading equipment manufacturers, that it's "good business to do business with Clark".

## CLARK EQUIPMENT COMPANY, Transmission Division

Falahee Road • Jackson 2, Michigan

Other Products of the Clark Automotive Division . . . TRANSMISSIONS . AXLE HOUSINGS . TRACTOR UNITS . TORCON TORQUE CONVERTERS . ELECTRIC STEEL CASTINGS . GEARS and FORGINGS . FRONT and REAR AXLES for TRUCKS, BUSES and OFF-HIGHWAY EQUIPMENT.

#### SEND FOR THIS TORCON BULLETIN





# Announcing the NEW Cross Chucking Transfer-matic

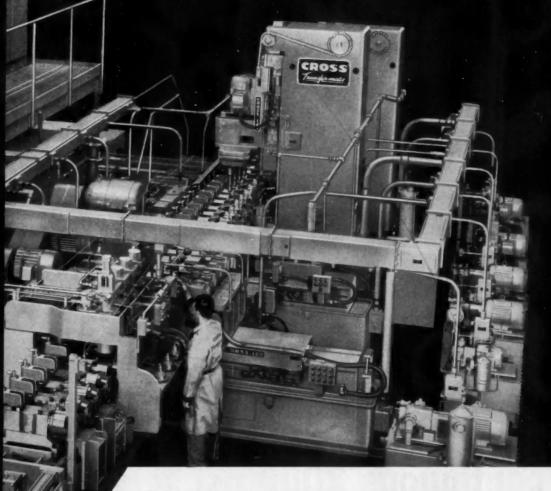








# Another Automation First by Cross



A completely new development! That's the Cross Chucking Transfer-matic ... the first chucker ever built on this principle. Standard Cross "building block" construction makes provision for any reasonable number of stations and work pieces up to 48" in diameter. This particular seven station Transfer-Matic, created for differential gear cases, has a rated capacity of 368 pieces per hour at 100%

An unusual feature is that the work pieces are chucked and not released until all operations are complete. The chucks are mounted on precision spindles, which in turn are carried on pallets-four to the pallet. There are ten pallets—one at each station and three on the conveyor moving from Station 7 to Station 1.

efficiency.

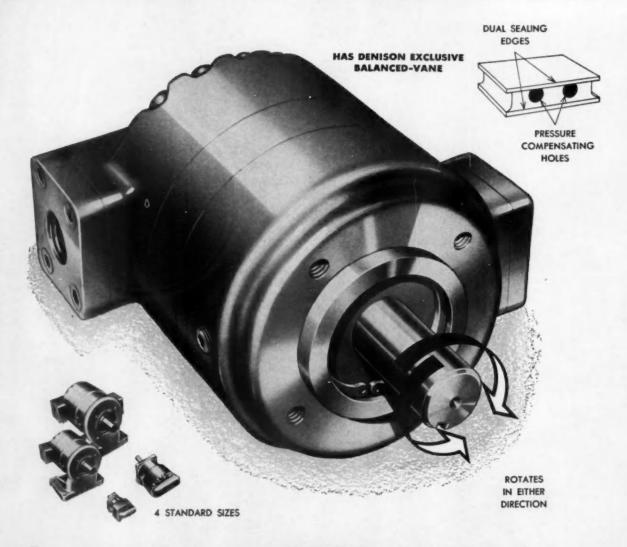
Operations are: Station 1, four pieces positioned in work holding chucks by loading mechanism and clamped automatically. Station 2, pilot diameters turned and side gear pockets bored. Station 3, spherical seats generated. Station 4, flange faces and thrust faces for side gears generated. Station 5, pin hole for pinion shaft drilled after spindles are indexed into pre-determined position and locked to prevent rotation. Station 6, pin hole chamfered top and bottom. Station 7, pin hole rough and finish reamed with shuttle head.

Features include construction to JIC Standards, hardened and ground ways, interchangeability of all parts, pre-set tooling and programmed tool changes with the Cross Machine Control Unit.

ROSS...

First in Automation

DETROIT 7, MICHIGAN



# for continuous 2000 psi service...

# Vane type Denison hydraulic single stage, Pump/Motor

IT'S A PUMP-high delivery in a small, compact package . . . a continuous 2000 psi pump.

IT'S A MOTOR-high stalled torque up to 257 pound-inches per 100 psi. Takes high shock pressures without danger.

**EXCLUSIVE**—Denison Radially Balanced Vane; Cuts wear between cam ring and vane; Increases efficiency with dual sealing edges; Reduces pulsation by radial pumping action of vanes.

#### SIMPLIFIES INVENTORY

No need to stock separate pumps and motors. Runs as a pump or motor without alterations. Range of capacities in each size through interchangeable cam rings.

EITHER DIRECTION—Operates efficiently as a pump or motor without change in piping. Minimum internal friction in either direction because of greatly reduced contact pressure between vanes and cam ring.

STANDARD SIZES—as a pump, Range of delivery 2.5 to 77 gallons per minute at 2000 psi. As a motor, Horsepower output 1 to 103 hp at 2000 psi.

**MORE INFORMATION**-Send for Bulletin P-5-A giving complete specifications. Write . . .

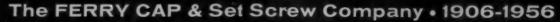
DENISON ENGINEERING DIVISION

American Brake Shoe Co.

1212 Dublin Road . Columbus 16, Ohio



HYDRAULIC PRESSES . PUMPS . MOTORS . CONTROLS



# 50th Anniversary

YESTERDAY—Our first shipment was a 25-pound keg delivered locally by horse and wagon.



TODAY—Ferry Cap products are used nationwide and reach our customers swiftly by truck, train, and plane.

SPECIALS
by the
MILLIONS

Not only does Ferry Cap make standard fasteners, but we are "specialists at special fasteners"... and we can supply them to your blue prints on short notice.

Odd shapes pose no problem, for we have long experience in providing the unusual. And your special can be furnished in many types of carbon, alloy, or stainless steel—and in non-ferrous materials as well.

With many types of production equipment for secondary machining, drilling, milling, grinding, and heat treating, we are equipped to give you special features and any plated finish. You'll find that Ferry Cap's thorough inspection system insures conformity to your specifications.

COUNTR-BOR®

A new screw for counterbored or other socket head screw applications.

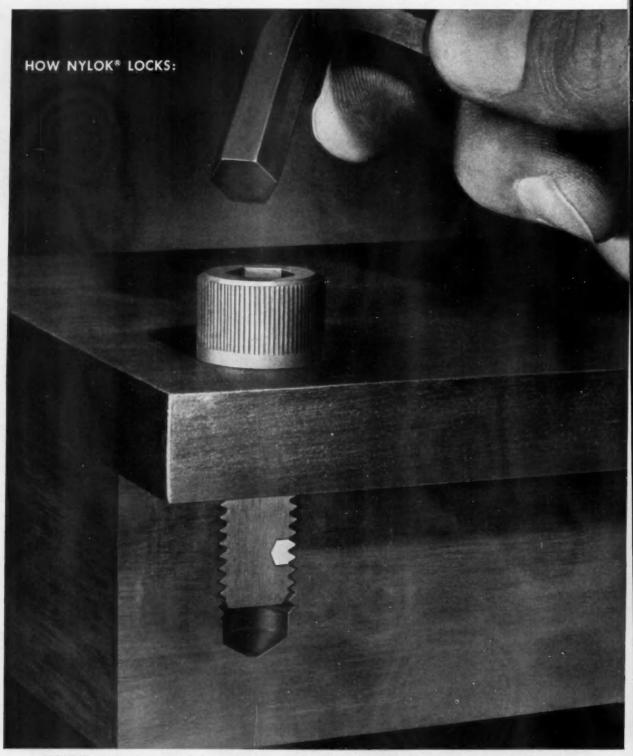


The FERRY CAP & Set Screw Company

Pioneers and Specialists, Cold Upset Screw Products Since 1906

2191 Scranton Rd., Cleveland 13, O.

# NEW-self-locking UNBRAKO



LOCKED! The tough, resilient nylon pellet keys itself into the mating threads. It forces threads together and locks the screw securely.

# socket head cap screws



Self-locking UNBRAKO socket head cap screw.



BEFORE ASSEMBLY. The nylon pellet projects slightly. When assembled, threads will be impressed into it.



AFTER REMOVAL. "Plastic memory" of pellet has expanded impressed threads to greater diameter than screw threads. Screw can be used repeatedly. In use, "memory" keeps threads tightly locked.

They won't work loose. And they simplify design and save production time.

UNBRAKO socket head cap screws are now available embodying the Nylok\* self-locking principle. Nylok provides the first truly practical solution to the problem of making cap screws self-locking.

An Unbrako cap screw with Nylok is a single self-locking unit. No auxiliary locking devices are needed. Just thread the Unbrako into any tapped hole. Seated or not, it locks positively wherever wrenching stops. The tough, resilient nylon pellet forces mating threads together and holds tight. The screw will not work loose.

You save production time when you make products with self-locking UNBRAKOS. And you get greater simplicity in design with less bulk and weight. The number of parts you must assemble to achieve full locking action is reduced to the absolute minimum. Lockwashers under screw heads are no longer necessary. Costly wiring of cross drilled heads is eliminated. And in many cases you will save weight and mass by using shorter screws in tapped holes instead of drilling through and using nuts and lockwashers.

Self-locking Unbrakos are reusable. They have uniform locking and installation torques—with no galling or seizing on mating threads. They successfully withstand temperatures from  $-70^{\circ}$  to 250°F. And, when screws are properly seated, the locking pellet also functions as a liquid seal.

A complete line of self-locking Unbrako socket screw products, in a wide range of standard sizes, materials and finishes, is available through your authorized industrial distributor. Technical data and specifications are detailed in Bulletin 2193. Write us for your copy today. Unbrako Socket Screw Division, STANDARD PRESSED STEEL Co., Jenkintown 53, Pa.

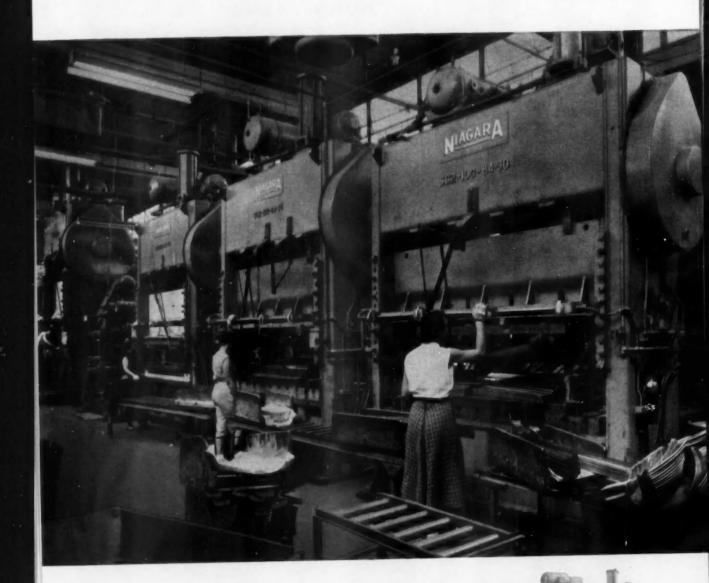
\*T.M. Reg. U.S. Pat. Off., The Nylok Corporation

UNBRAKO SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.



# "we concentrate on Niagara





DOUBLE CRANK STRAIGHT

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work

# presses...

In-line operation of four Niagara Series SC-2 Presses, engaged in progressive production of automotive side moldings from .025" #430 stainless steel.

Press operator shows a blank and formed molding which will grace one of the "Big Three" cars.



SIDE PRESSES

# ...they require a minimum of maintenance"

Producing up to 1,750,000 automotive moldings per month, these four Niagara Double Crank Straight Side Presses do the work of eight for a large Midwestern metal stamping firm. Their long beds enable the outfitting of each press with two sets of dies for two separate operations.

"We believe in standardizing. That is why we concentrate on Niagara Presses. They require a minimum of maintenance. When jobs come in, we are sure we can get them out. They are a volume machine," says the vice president and plant superintendent.

... and with good reasons, this famed line of Niagara presses requires a minimum of maintenance:

- Rugged, integral, all-welded steel frames of exclusive triple box section design properly resist deflection to assure greater accuracy and longer die life.
- Laminated non-metallic ways of box type welded steel slides are a positive safeguard against scoring and assure troublefree service.
- Low inertia pneumatic friction clutch reduces heat and wear. Only the shaft and driving plate are started and stopped at each cycle. Most of the clutch weight continues to rotate with the flywheel.
- Outboard mounting of clutch makes it accessible for easy maintenance... without disturbing any drive or crown parts.
- No adjustment for wear of clutch plate is necessary. It is self-compensating.
- Clutch linings are cycle-welded to plate, without rivets, increasing effective life.
- Brake shoes are full floating and self-aligning . . . cannot cock, bind or wear unevenly.
- Steel gears run in totally enclosed oil baths. Centralized pressure lubrication sends vital oil to journals, ways and wherever necessary for long efficient, service life.

Like this well known metal fabricator, it will be profitable for you, also, to consider standardizing on Niagara presses. First of all, Niagara has the most to offer . . . straight side double crank, single crank and eccentric geared, open back inclinables and dozens of others. Secondly, in the words of the same company's purchasing agent: "The prices on Niagara Presses are right . . . and they do the job."

Built in 50 through 400-ton capacities, Niagara Double Crank Straight Side Presses are readily equipped with automatic feeds, variable speed drives, iron hands and other automatic materials handling devices so popular with the automotive and appliance industries. Post yourself on this important line by requesting Bulletin 64.



NIAGARA MACHINE & TOOL WORKS . BUFFALO 11, N. Y.

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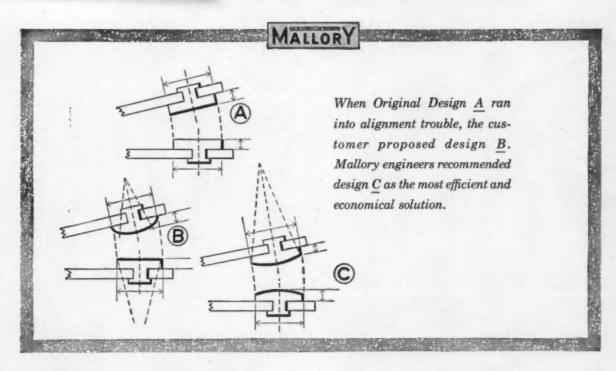
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handling equipment

MECHAN Roller Bearing BW UNIVERSAL JOINTS

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# How economical are your contact designs?

## Mallory Contact Engineering Offers Five Ways To Improve Economy

- The most effective contact material from the extensive line developed by Mallory. More economical alloys often can satisfy actual service conditions.
- The most economical contact design... for your purchasing, production and product needs.
- The most economical backing material ... from a group of Mallory alloys developed for this use.
- The most economical backing member design...in relation to contact and product design requirements.
- The most economical method of assembly of contact and backing member.

By coordinating all these important elements of contact design, Mallory can help you put into effect a long-range plan for cutting contact cost and assuring peak performance.

DESIGN of electrical contacts is an engineering job in which Mallory's specialized experience can often lead to substantial savings for you. A case in point—a manufacturer of circuit breakers wanted to use a combination of flat and radius-faced contacts to lick an alignment problem in production. This design required buying and stocking of two separate contact parts.

Mallory contact engineers came up with a money-saving improvement. They recommended a modified radius design to go on both the stationary and moving contacts. Substantial production time was saved by elimination of the alignment difficulty in assembly. In addition, by buying a single type of contact engineered for the job, instead of two separate designs, the manufacturer cut his inventory problem in half, simplified purchasing and handling, and saved a significant percentage of direct contact cost as well.

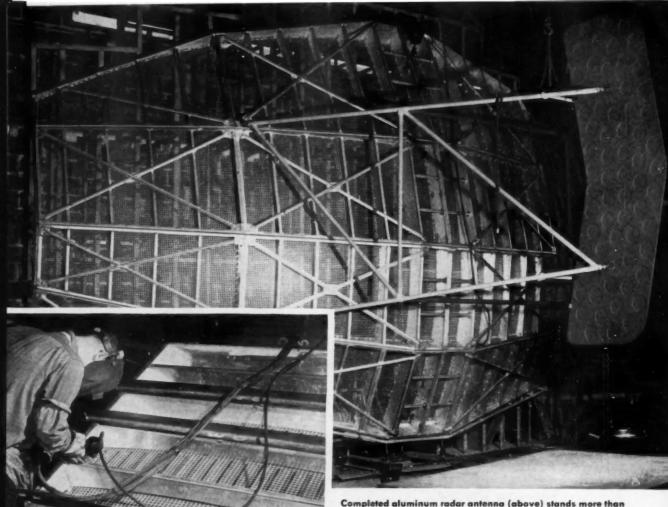
There's a good chance that you can realize comparable savings on your own contact applications, by bringing your problems to Mallory specialists. The complete engineering job that our staff can undertake will assure you of gaining the maximum in performance . . . at the peak of economy . . . for your specific requirements. For a consultation, write or call Mallory today.

Expect more ... get more from

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Electromechanical—Resistors • Switches • Television Tuners • Vibrators
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Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA



Completed aluminum radar antenna (above) stands more than 20 feet high at the Garden City, Long Island, plant of General Bronze Corporation. At left, a welding operator uses General Electric Fillerarc\* equipment to weld  $\frac{3}{32}$ " diameter aluminum screen to an antenna section frame—a tough welding job because all welds must be sound enough to support the weight of the antenna under constant buffeting from the wind.

# Fillerarc\* welding of radar antennae is 10 times faster, costs 25% less

Fabricating giant, aluminum radar antennae can be a costly and time-consuming operation. But General Bronze Corporation of Garden City, N. Y., has found that compared with the tungsten-arc method formerly used, it can speed such welding 10 times while cutting costs 25 per cent with General Electric Fillerarc gas-shielded, consumable-electrode equipment.

Requirements for welding the antennae are demanding. Each antenna is composed of sections of varied size and shape, which must be assembled to form the completed unit. Materials used range from  $\frac{1}{8}$  aluminum frame to  $\frac{1}{16}$  cross channels and  $\frac{3}{32}$  diameter aluminum screen.

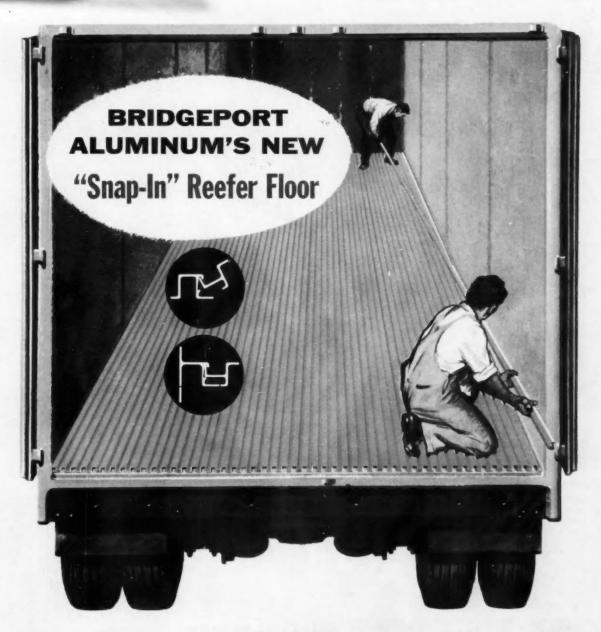
\*Registered trademark of the General Electric Co.

Preliminary tests using semi-automatic Fillerarc equipment resulted in strong, smooth welds, and the trouble and expense of cleaning up flux was eliminated. So, General Bronze now uses Fillerarc welding equipment on all its antenna work and is looking for other jobs Fillerarc can do faster and at less cost.

And, Fillerarc is versatile. It can weld mild and stainless steel, bronze, nickel, and magnesium. For more information on how Fillerarc can save you time and money, call your nearby General Electric welding distributor (see the yellow pages of your phone book), or write for bulletins GEC-989 and GEC-1334 to Section 713-6, General Electric Co., Schenectady, N. Y.

Progress Is Our Most Important Product

GENERAL & ELECTRIC



## QUICKLY INSTALLED ... RIGID ... WATERTIGHT ... LIES FLAT on 35-foot assemblies!

Now, something really new in a reefer floor section: Bridgeport's unique "snap-in" design. Trims weight, reduces wear, gives you a rigid watertight assembly. Saves hours of installation time, too, because Bridgeport designed it to *lie flat*—even in 30- to 35-foot assemblies.

The "snap-in" floor section is typical of the complete line of standard truck and trailer sections available from Bridgeport without die charge. All are especially engineered to meet your design and strength requirements.

And remember: Bridgeport's modern, fully integrated facilities are at your service to produce standard or special shapes in any alloy or temper—to your exact specifications. For complete information or help in the application of aluminum extrusions to your product, call the nearest Bridgeport Sales Office. Our facilities are at your disposal.

For the very newest in BRIDGEPORT, ALUMINUM BE

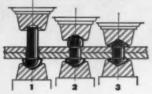
EXTRUSIONS, DIE AND HAND FORGINGS

Bridgeport Brass Company, Aluminum Division, Bridgeport 2, Connecticut . Offices in Principal Cities



# STRONGER JOINTS!

This "silent squeeze" method gives you (1) rapid advance to riveting position, (2) highpressure shaping of the rivet, cold or hot, and (3) automatic reversal as soon as the rivet is formed. Why are these rivets stronger? Because with this method the rivet shank ex-



pands to completely fill the hole and, as the metal flows to shape the heads, fillets are formed under both heads. The rivet is workhardened, too, and every rivet is uniform.

## RIVETING



Yes! From the time the button is touched it takes only 21/2 seconds to head a 3/8" rivet. "Hy-Power" is safe, too! For the stroke can be interrupted and the ram reversed automatically anywhere in the cycle, simply by releasing the control button.

# ETER OPERATION

Here's the power source for this modern riveting method . . . it's the Hannisin "Hy-Power" Generator. This compact unit is a combination of motor, pump, oil reservoir, automatic control valves and high pressure intensifier that quietly supplies hydraulic pressure to...





..your "Hy-Power" cylinders-available in 7½, 10, 12½, 17½, 25, 35, 50, 75 and 100-ton capacities (more in multiple). Cylinders can either be mounted in yokes (portable or stationary) or installed in machines of your design.

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Get Bulletin 150. Learn why cost-conscious firms in many fields use "Hy-Power." Just write for your copy of this 32-page book. We'll mail it promptly.



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Air Control Valves



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- What do car buyers want in car finishes these days? Ask one who has just put the wax and polish back on the shelf and chances are he'll say, "Give me more stainless steel."
- More car dealers, too, are pointing to the stainless steel
  features. The reason is obvious. Car buyers realize the
  value of stainless steel. They like the way their trim returns
  to its new-car brilliance under the hose, and the way
  it resists road abrasion, denting and pitting. They like
  the idea of a solid metal—not simply a coating.
  - Just as car buyers who know desire stainless, so do steel buyers who know specify Sharon stainless—the steel with the industry's finest finish—coil after coil.





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COMMENT AT THE METAL SHOW!

This is the

Forgive us the informality of our headline. A lot of people at the Metal Show made this comment so we use it instead of the conventional superlatives.

A completely new furnace
 No elements, no burners, no electric or gas connections
 in it
 Circular shape reduces temperature losses, saves floor space
 Greatly lowered maintenance costs
 More accurate temperature control
 Quiet, automatic, fool-proof.

There just never has been a heat treating furnace like this new Lindberg Induct-O-Ring. Radically different, it has no elements, element terminals, burners, electric or gas connections in the furnace proper. The chamber, lined with a heat-resistant alloy muffle and deeply insulated, is heated by induction. All the heat is in the chamber and the work load.

Heating efficiency is high and the heating rate spectacular, with hardening temperatures reached in 17 minutes from cold. Temperature control is highly accurate and precise and temperature override and lag is eliminated for all practical purposes.

With no burners or heating elements maintenance costs and down-time are materially reduced and atmosphere requirements held at a minimum.

The Induct-O-Ring's circular shape eliminates door-opening heat and atmosphere losses and saves floor space. Actually, it is possible to have 30 feet of furnace length in a 5 foot diameter unit. Operation of the furnace is extremely simple. Work load is automatically charged and moved through the work chamber by a gentle reciprocating movement of the entire furnace. Work is then automatically discharged into quench tank.

The Induct-O-Ring is built like a fine machine tool. Sealed ball bearings support the moving parts of the furnace. Quench tank, quench conveyor, circulation and cooling of the quench are all self-contained.

The furnace is completely adaptable to automated production processes where its precise heat control, negligible maintenance, and dependable operation are of particular importance.

We are sure that the Induct-O-Ring offers an entirely new concept in heat treating efficiency and economy. You can very easily find out how it can be used in your production processes. Just call your nearest Lindberg Field Representative (consult your classified phone book).



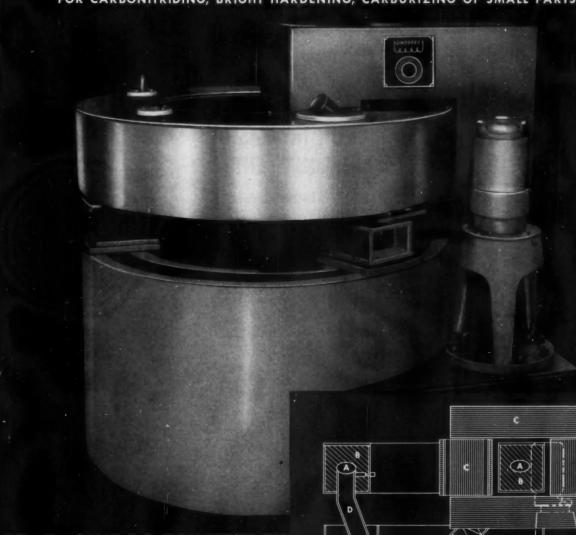
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Los Angeles Plant: 11937 S. Regentview Ave., at Downey, California

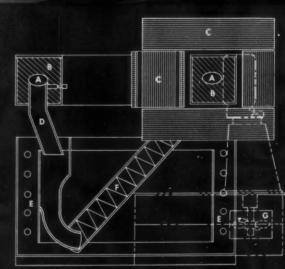
# d---dest furnace " Dever saw" induct-O-ring

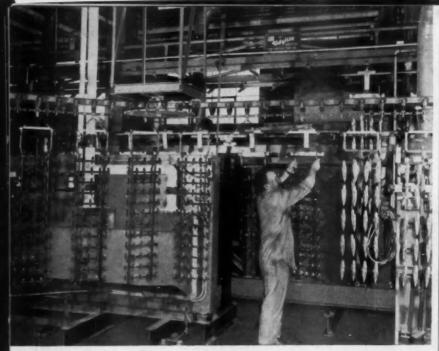
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\*U.S. and foreign patents pending





# QUALITY IMPROVED — PRODUCTION INCREASED WITH UDYLITE PROCESSES AND EQUIPMENT

In the manufacture of rear view automobile mirrors by Yankee Metal Products Corporation of Norwalk, Connecticut, a variety of die cast parts are used. All of these die cast parts are copper, nickel and chrome plated on the Udylite Full Automatic Plating Machine. Shape and sizes of these parts vary considerably.

The Udylite Full Automatic handles the complete processing of the parts from the bare die castings to a finish ready for final assembly. Its operation has provided perfect precision, a doubled capacity and a minimum of rejects.

Udylite Bright Nickel has played an important part in the perfect coverage of these die castings. With the chrome overlay, Udylite Bright Nickel has provided not only the glistening finish demanded for this luxurious line, but also the guaranteed protection for these accessories which are constantly subjected to attack by the elements.

Hand in hand, Udylite equipment and processes are solving many plating problems. Providing sales appeal finishes—plated protection—multiplied production. Find out how you can use these same advantages.



WORLD'S LARGEST PLATING SUPPLIER

# CALENDAR

OF COMING SHOWS AND MEETING

SAE National Diesel Engine Meet-
ing, Drake Hotel, Chicago, Ill. Nov. 1-2
National Tool & Die Manufacturers Association Convention, Statler
Hotel, Hartford, Conn Nov. 1-4
Hotel, Hartford, ConnNov. 1-4 SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, OklaNov. 8-9
Cycle and Motorcycle Show, Lon- don, England
American Petroleum Institute, an- nual meeting, Conrad Hilton
Hotel and Palmer House, Chi- cago, IllNov. 12-15
National Industrial Development
Exposition, Coliseum, New York, N. Y
Commercial Museum, Phila., Pa
ler, New York, N. Y Nov. 25-30 Third International Automation Exposition, New York Trade
Show Building, New York, N. Y. Nov. 26-30
ASME National Exposition of Power
and Mechanical Engineering, Coliseum, New York, N. Y., Nov. 26-30
American Association of State High- way Officials, annual meeting,
way Officials, annual meeting, Atlantic City, N. JNov. 27-30 Society of the Plastics Industry,
Film, Sheeting, and Coated
Fabrics Div. Conference, Com- modore Hotel, New York, N. Y. Dec. 4-5
Material Handling Institute annual
meeting, Biltmore Hotel, New York, N. Y. Dec. 10-11 National Automobile Show, Coll- seum, New York, N. Y. Dec. 8-16
National Automobile Show, Coli- seum, New York, N. Y Dec. 8-16
1967
Chicago Automobile Show, Interna-
tional Amphitheater Chicago
Chicago Automobile Show, Interna- tional Amphitheater, Chicago, IllJan. 5-13
SAE Annual Meeting, Sheraton-
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# The original GUSHIQMED ride\*

## was developed with LEAF SPRINGS

The "built-in" characteristics of leaf springs include the entire range of flexibility from "soft" to "hard". They can give you exactly the ride you want (without addenda), from the ultimate in softness to the extreme in rigidity.

The "built-in" features of leaf springs also provide: cushioned impact or thrust of "stops" and "starts"; self alignment of springs, frame, and axles; load balance control; sidesway control; and shock-absorbing action through rebound control.

And the PLUS FACTOR of utmost economy for both manufacturer and customer.

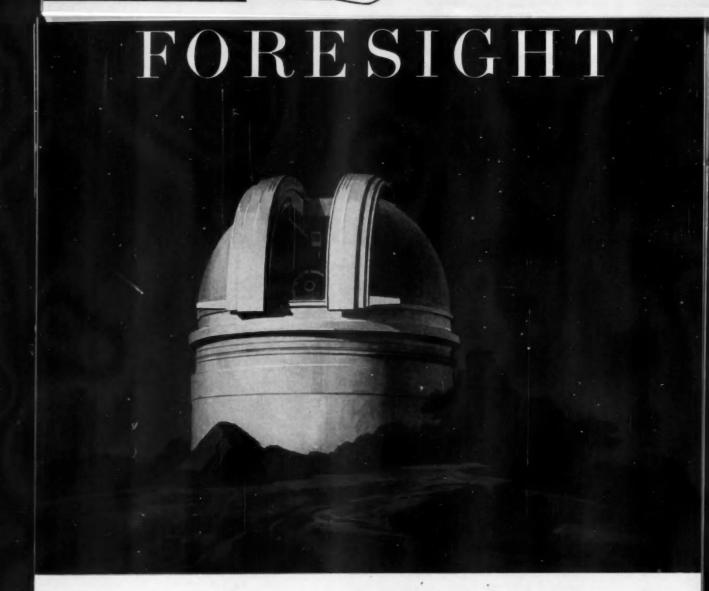
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Since the earliest days of the industry, Bendix foresight in product design and development has contributed materially to automotive progress.

For example, Bendix\* power braking and power steering, two of the industry's most popular new car features, are the results of years of research and engineering by Bendix specialists in these important fields.

Today Bendix engineers are likewise busy planning

and developing new and better products to meet the needs of the years ahead.

It is because of this foresight the automotive industry looks to Bendix for components that continue to lead in public acceptance and dependable performance.

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# **High Spots of This Issue**

## ★ TorqueFlite Transmissions Produced in Automated Plant

In keeping with the industry trend toward further advances in automation with each new plant built is the Chrysler automatic transmission plant at Kokomo, Ind. The author pinpoints here outstanding examples of new equipment. Page 48.

## \* Studebaker's New Models Include Supercharged Hawk

Fourteen sedans and four station wagons will be offered in the President V-8, Commander V-8, and Champion six-cylinder series for 1957. The tripartite Hawk line will feature a hardtop with a supercharged 289 cu in. V-8. Page 52.

## \* Latest Czech Designs at Brno Exhibition

Typical examples of the growth of heavy industry in Communist satellite countries abounded at the recent Czech Brno Exhibition. Among them were interesting machine tools and vehicles, described in this eye-witness account. See Page 58.

## New Design Features of Mercury for 1957

Higher-powered engines and new, larger bodies are prime attributes of Mercury's offerings in the 1957 automotive parade. A host of other styling innovations and various mechanical improvements are featured throughout. See Page 62.

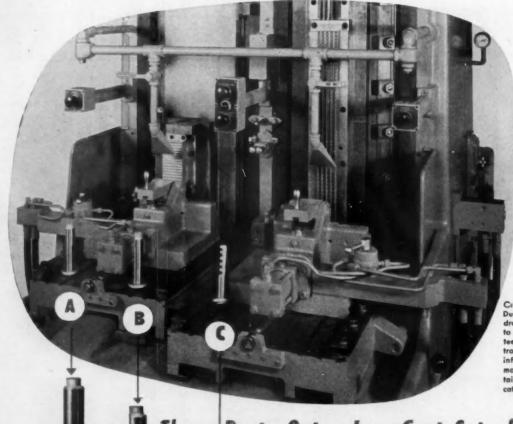
## ★ Buick for 1957 Has Stepped-Up Performance

Already well known as a "powerhouse," the new Buick will have still greater liveliness as the direct result of a redesign of major engine elements. Styling has by no means been overlooked, as indicated in the body treatment. Page 66.

## ★ 30 New Product Items And Other High Spots, Such As:

GMC trucks for 1957; SAE transportation meeting; redesigned Oldsmobile; new Pontiac has larger engine; longer, lower Dodges; 1957 De Soto; new Plymouth; Nash Ambassador with new headlamp system; new Chrysler and Imperial models; Metal Show; higher-powered Dodge trucks; Studebaker adds heavy-duty vehicles to truck line; and hydraulic steering gear actuator.

Complete Table of Contents, Page 3
Automotive and Aviation News, Page 33



CINCINNATI No. 10-66 Duplex Vertical Hy-dro-Broach, tooled up to broach the rack teeth on parts illustrated here. Complete information on these machines may be obtained by writing for catalog No. M-1848.

These Parts Get a Low Cost Set of Teeth

# on CINCINNATI VERTICAL HYDRO-BROACH MACHINE

Surface broaching, as a machining operation, cut its teeth years

ago. Today it is being applied to an ever-increasing variety of parts and operations, including the machining of rack teeth. Cincinnati Application Engineers know how to broach a lowcost set of teeth on short parts or yard-long parts. The most recent example of their work is illustrated here: a Cincinnati No. 10-66 Duplex Vertical, with complete tooling, ready to broach the teeth on piston rod racks at the lowest cost. The parts arrive completely turned and the stem rough ground. Rack teeth are broached in two progressive operations; a flat which forms the top of the teeth is broached in the left-hand station, and the rack teeth are broached in the right-hand station. Production, 100 per hour complete. ¶CINCINNATI Hydro-Broach Machines and Cincinnati Application Engineers form CINCINNATI No. 10-66 a team that just can't be beat in visualizing and building complete production packages for your work. These men are ready to help you solve your production problems. Why not write now,

enclosing blueprints and complete details.

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO



Prior to Hydro

Teeth Hydro-Broached in second station. Finish of teeth, 40 to 50 micro-inches; accuracy .0004" on linear pitch. Production complete, 100 per hour.



Duplex Vertical Hydro-Broach, Catalog No. M-1848.

CINCINNAT

Flat Hydro-Broached

in first station

MILLING MACHINES - CUTTER SHARPENING MACHINES - BROACHING MACHINES . METAL FORMING MACHINES . FLAME HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS . CUTTING FLUID

AUTOMOTIVE INDUSTRIES, November 1, 1955

# Theus of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 115, No. 9

November 1, 1956

### Report That Cadillac Brougham Will Cost \$12,500 Unconfirmed

A report that Cadillac's ultra luxury model—the El Dorado Brougham—would be priced at \$12,500 is questionable and unconfirmed. That the company would place such a high price tag on the car is doubtful, particularly since it will be competing directly with Ford Motor Co.'s plush Continental Mark II, now selling for \$10,000.

The Brougham has been designed chiefly as a prestige car. Annual production will be limited between 1000 and 1500 units, and the price is expected to be closer to the Continental range. The company has indicated that it does not plan to make real money on the Brougham, slated to hit the market next February.

Like many other companies, Cadillac looks forward to a decided improvement in sales next year. The division estimates its sales should climb to between 155,000 and 160,000 units to indicate a market penetration of 2.4 per cent based on predicted industry-wide sales of 6.8 million cars. Cadillac was one of the few automobile companies to achieve a record in 1956 model year production of 154,631 cars, or about 10 per cent ahead of the 1955 model year.

#### Average 7.4% Price Increase Is Made On '57 Lincoln Cars

Price increases of \$377 have been posted on two 1957 Lincoln models. The smallest increase of \$255 appears on the hardtop coupe in the Capriseries. The average boost on Lincoln's 1957 cars amounts to 7.4 per cent.

Included in the 1957 prices are two items which previously were offered at extra cost and a third one which was not available on 1956 models. These include power brakes, rear li-



#### CUSTOMIZED CONTINENTAL CONVERTIBLE PRESENTED

Continental Mark II Cabriolet Convertible was created through the joint cooperative efforts of Lincoln Div. of Ford Motor Co. and Derham Custom Body Co. Finished in pearlescent white lacquer and trimmed in red and white leather, it is the first true Continental convertible built since production of the Lincoln Continental series was suspended in 1948. The car stands only 57 in. high, although the convertible top has been rounded more than the roof of the standard hardtop coupe.

cense plate frame, and a remote-controlled side view mirror, the latter being the new item.

#### LINCOLN PRICES\*

1956	1957
3,933	\$4,101 4,222 4,222
4,305 4,295	4,552 4,672 4,672 4,808
	\$3,846 3,933 4,305 4,295

Suggested factory list prices, excluding Federal excise, state, and local taxes, and delivery and handling charges, on Lincolns for 1957, compared with 1956 models.

### New Non-Automotive Division Is Formed By Ainsworth Mfg.

A new non-automotive division has been formed by Ainsworth Manufacturing Corp. under its diversification program. Called Ainswall, the division will produce and distribute movable wall partitions in the Midwest, as well as standard partitions and frames for offices.

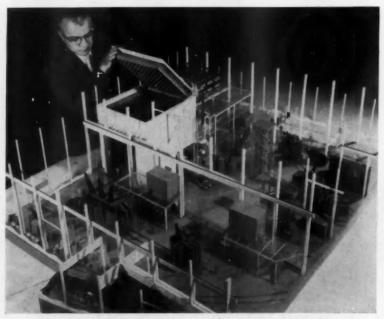
#### Imperial Car Series Is Moved Toward Further Independence

Further steps toward separating the Imperial car from the Chrysler Div. line of automobiles to give it more prestige was taken with introduction of the 1957 models. One move is a broadening of the line to four distinct series in a wider price range, including the Imperial, Imperial Crown, the LeBaron and Imperial Limousine.

Nine models are offered in these series for 1957, compared with only four in the 1956 model lineup. Another significant move is the addition of a convertible for the first time, now offered in the Imperial Crown series.

The Imperial car was introduced as a separate line with the 1955 model, and gradual steps toward divorcing it from the Chrysler name have been made ever since. Included has been the installation of separate custom assembly lines at the Kercheval and Jefferson Aves. plants in Detroit.

# Mews of the AUTOMOTIVE



#### TEST FACILITIES FOR NOISE AND HIGH VOLTAGE

Being checked here is a model of a recently completed Westinghouse \$3.5 million anachoic vault — a giant noise testing room — and high-voltage test center for transformers. These facilities mark the completion of a \$13 million expansion program at the Westinghouse Transformer Div., Sharon, Pa., which has increased its productive capacity for power transformers by more than 30 per cent. Scheduled for use primarily in research and development, the test center will aid in designing more efficient and quieter, yet smaller and lighter transformers for the future. Capable of testing transformers of at least 500,000 kva and weighing more than 400 tons, the anechoic vault is as high as a five-story building and runs 70 ft in length.

# FOREIGN CARS OUTDISTANCE SOME U. S. VARIETIES 1956 New Passenger Car Registrations\*

Arranged by Makes in Descending Order According to the 1956 Eight Months' Totals

EIGHT MONTHS Moite Per Cent of Total MAKE 1956 1956 141,737 125,962 44,928 44,221 38,294 30,618 25,951 20,176 1,092,517 923,454 390,526 346,515 318,347 257,249 197,363 156,331 199,007 85,423 72,045 57,649 57,649 57,642 30,406 24,142 23,555 1,178 26.06 22.02 9.31 8.27 7.89 6.14 4.71 3.71 2.36 2.04 1.72 1.38 1.38 .73 .56 .03 55,202 47,216 359,805 248,054 193,233 97,343 34,851 23,726 12,620 12,635 9,378 9,302 7,310 2,710 4,043 4,362 5.15 4.01 568 193,233 97,343 111,378 83,421 66,354 69,523 21,414 31,979 36,039 2.02 2.31 1.73 1.38 1.44 .44 .66 .75 471 5,509 .13 439 8,273 Total-All Makes... 568,320 100.00 534.997 656,964 4,191,304 4,817,320 100.00

### Ford Motor Elects Nance Marketing Vice-President

Speculation about the future of James J. Nance, former president of Studebaker-Packard Corp., was answered last month with the announcement that he has been elected by Ford Motor Co. to the newly created post of vice-president of marketing.

The move came as a surprise to many industry observers. Nance, who resigned as S-P's chief on Aug. 7 following an agreement with Curtiss-Wright Corp., had been mentioned for a number of top executive positions with such non-automotive companies as Westinghouse Electric Corp. and Montgomery Ward Co.

In addition to his position as a Ford vice-president, Nance also will serve as a member of the administration committee and as chairman of the company's merchandising committee. Nance's decision to join Ford leaves one question unanswered—whether he is still entitled to collect the \$286,000 which he was to be paid for relinquishing his \$150,000-a-year contract with Studebaker-Packard.

Under the agreement between S-P and Curtiss-Wright, Nance indicated he would forfeit al! of his settlement rights if he took "competitive employment," meaning joining another automobile company. It is not certain, however, whether he was held to that stipulation.

#### New Oldsmobile Upholstery Has Rather Novel Features

Oldsmobile is offering a new type of upholstery on its 1957 cars which produces a three-dimensional effect and affords more designs. Called Airweave Trilok, the material, woven from polyethylene yarn and nylon fibers, is said to retain its shape regardless of any pressure, heat or humidity to which it may be subjected.

The three-dimensional effect is accomplished by shrinking the fabric in boiling water, under controlled conditions, causing the face of the fabric to rise in puffed patterns. The new upholstery will be offered on the 98 Holiday sedan, Super 88 Fiesta station wagon, and Super 88 Holiday sedan.

<sup>\*</sup> Based on data from R. L. Polk & Co.

# AND AVIATION INDUSTRIES

### Hupp Moving Headquarters From Detroit To Cleveland

Hupp Corp., which has been diversifying into numerous fields in the past few years, is moving its head-quarters from Detroit to Cleveland. Since it launched its diversification program, Hupp has acquired a number of firms. Each now operates as a division producing products ranging from automobile accessories to electronics components.

The move from Detroit to Cleveland is being made on a gradual basis. The company plans to continue manufacturing operations at its Detroit plant, where it has been producing electric window regulators for Ford and Chrysler.

### Mercury Shoots For 6.5% Of Sales Market In 1957

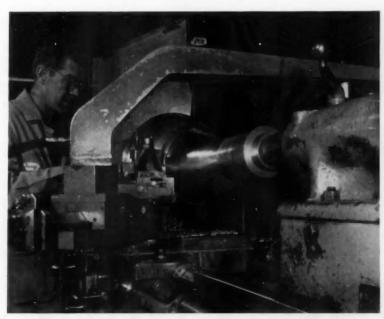
The fact that Mercury Div. spent \$100 million for designing and developing its 1957 line of automobiles serves as a further illustration of the gigantic costs involved in this year's major retooling program by the automobile industry. The company is confident that its new models, which feature extensive changes, should help it boost sales. It is aiming at 6.5 per cent of the total industry market, which would be about 1½ per cent more than it does now.

# Expansion Progress Recorded At GM European Operations

Considerable progress has been made in the last year on expansion programs at General Motors European plants, according to Harlow H. Curtice, GM president. He recently returned to the U. S. from an extensive tour of the company's installations in Europe.

The tour covered three of the corporation's largest overseas automobile plants—the Opel plant at Russelsheim, Germany; GM Continental at Antwerp, Belgium; and Vauxhall Motors at London, in addition to ACDelco and Frigidaire operations in Great Britain.

Now that its three-year expansion program has been practically completed, the Opel plant soon will have



# HARD SHAFT FOR JET ENGINE PRECISION MACHINED

Gleaning cone-shaped shaft for a powerful, new 15,000-lb thrust jet engine is shown in production at Diversey Engineering Co. Although tabricated from one of the hardest super-alloys yet developed, these shafts are contour-turned to high standards of accuracy and surface finish. An air-gage, tracer-equipped Monarch 20-in. manufacturing lathe is used. The lathe's tracer mechanism, guided by a precision template manufacturing at the rear of the machine, consistently reproduces the required shaft contour within a tolerance of .002 in. Surface finish is obtained by using high speed tools measuring 63 micro-inches or better in standard production runs.

# SEVERAL MAKES SHOW GAINS IN AUGUST OVER JULY 1956 New Truck Registrations\*

Arranged by Makes in Descending Order According to the 1956 Eight Months' Totals
EIGHTIMONTHS

					.minition			
		Later	Account	Ur	rita	Per Cen	t of Total	
MAKE	August 1956	July 1956	August 1955	1956	1955	1956	1955	
Chevrolet	26,451	25,738	31,650	205,446	201,166	33.51	32.95	
Ford	24,890	23,640	29,461	182,737	194,230	29.80	31.81	
International	9.727	9.854	9.254	74.262	69.752	12.11	11.42	
G.M.C	7.021	7.244	8.920	57.591	50,049	9.39	8.20	
Dodge	5.182	5.091	6.095	39,704	44.718	6.47	7.32	
White	1,133	1.388	1.140	10.610	8,980	1.73	1.47	
Mack	1.222	1.165	1.061	8.965	6.884	1.46	1.13	
Willys Truck	1,174	1.111	1.306	8.858	10.558	1.44	1.73	
Studebaker	778	756	908	6 554	7.716	1.07	1.28	
Willys Joen	786	763	856	6.542	6 384	.90	1.05	
Diamond T	330	402	314	2 782	2 350	.45	.38	
Divee	234	267	279	2 218	2 204	.36	.38	
Bee	237	244	278	2.026	1 884	33	31	
Kanworth	152	138	102	013	704	15	.12	
Becelemen	50	77	83	863	690	.11	.11	
D. Acres 150	40	72	40	412	302	.07	08	
Peterbilt	66	24	23	210	160	05	03	
Misc. Domestic	97	60	74	737	828	12	.08 .03 .10	
	402	262	920	9 833	1,219	40	.20	
Foreign	403	982	220	2,002	1,210		.20	
Total All Bilakes	70 021	70 404	00.070	612 242	010 ETS	100.00	100 00	

\* Based on data from R. L. Polk & Co.

# Mews of the AUTOMOTIVE

the capacity to produce 300,000 passenger cars, trucks, and vans annually. The addition of 2.6 million sq ft of floor space now gives that plant a total floor area of 8.3 million sq ft. Opel's production this year is expected to approximate a record 208,000 units for the domestic and export markets, about 20,000 above 1955.

Expanded assembly facilities at the GM Continental plant at Antwerp will enable it to turn out 53,000 cars and trucks in 1956. Production is ex-

pected to increase by 10 per cent next year.

The expansion program at Vauxhall Motors in London should be completed by the end of this year. The company hopes to double capacity there to 250,000 units annually eventually. Included in the Vauxhall expansion is the addition of more than three million sq ft of space for a new press shop, body and final assembly building at Luton, and truck manufacturing and parts warehousing facilities.

### 1956 WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

		Total			
Make	Oct. 20	Oct. 13	Oct. 6	Sept. 29	Jan. 1 to Oct. 20, 198
PAS	SSENGER	CAR PRO	DUCTION		
Hudeon	162	234	273	327	21,538
Nach	561	583	529	403	80,928
Rambior	1,603	1.783	1,765	1,570	11,128
Total-American Motors	2,326	2,570	2,567	2,300	83,594
Chrysler and Imperial	804	721	348	72	81,380
De Soto	1.704	1.135	543	56	74,632
Dodge	4.025	3,402	2.540	2,826	149,059
Plymouth	7,082	6,239	3,703	1,864	332,272
Total-Chrysler Corp	13,615	11,497	7,134	4,618	837,343
Ford	31,633	25.340	28.034	23.262	1,009,387
incom and Continental	790	885	914	1,157	39,304
Mercury	2,551	1,860	661	40	192,076
Total-Ford Motor Company	34,983	28,085	29,609	24,459	1,240,767
luick	747	210	1.229	1.217	429,499
adillac	0	0	0	0	114,993
hevrolet	31,414	28,944	13,960	0	1,267,247
Oldsmobile	753	197	1.137	5.738	346,133
ontiac	2,044	208	2,380	4,444	263,004
Total-General Motors Corp	34,958	29,589	18,708	11,397	2,420,876
ackard	0	0	0	. 0	13,289
tudebaker	2,487	2,100	1,632	336	60,992
Total-Studebaker-Packard Corp.	2,467	2,100	1,632	336	74,281
hecker Cab	99	59	94	96	3,089
Total—Passenger Cars	88,448	73,870	50,742	43,206	4,459,950
	TRUCK	PRODUCT	ION		
vailable	9	4	4	11	311
	7,094	6,598	5,752	0	283,679
hevrolet					74.288
. M. C.	1,781	1,623	1,337	74	
i. M. C.	104	95	132	117	4,242
i. M. C.	104	95 60	132 60	117 60	4,242 3,037
i, M. C. Namond T Nivoo Nodge and Fargo ord	104	95	132	117 60 1,553 6,401	4,242 3,037 71,948 247,285
i. M. C. Namond Y Nivoo Jodge and Fargo ord ' W. D.	104 60 1,959 5,330 32	95 80 2,002 5,512 36	132 60 1,963 5,801 21	117 60 1,553 6,401 33	4,242 3,037 71,948 247,285
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i, M. G. Niamond T Nvoo Oodge and Fargo ord. . W. D. International Acck	104 60 1,959 5,330 32 2,749 328	95 80 2,002 5,512 36 2,642 292	132 60 1,963 5,801 21 2,484 295	117 60 1,553 6,401 33 2,687 501	4,242 3,037 71,948 247,285 1,366 111,347 14,893
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i. M. G. Jiamond T Proge and Fargo ord W. D. Anternational fack farmen-Horrington lee . Ludebaker //tite	104 60 1,959 5,330 32 2,749 328 2 71 320	95 00 2,002 5,512 36 2,642 292 11 88 101	132 60 1,963 5,901 21 2,484 296 20 72 4	117 60 1,553 6,401 33 2,687 501 21 89 0	4, 242 3, 037 71, 948 247, 285 1, 366 111, 347 14, 893 688 3, 173 11, 827
i. M. C. Juamond T Ivoca Juamond T J	104 60 1,959 5,330 32 2,749 328 2 71 320 346	95 00 2,002 5,512 36 2,642 292 13 88 101 330	132 60 1,963 5,801 21 2,484 295 20 72 4 350	117 00 1,553 6,401 33 2,687 501 21 89 0	4,242 3,037 71,948 247,285 1,366 111,347 14,093 648 3,173 11,827 14,472
i. M. C. Jiamond T Jivoo Jodge and Fargo. ord	104 60 1,959 5,330 32 2,749 328 2 71 320 346 1,396	95 00 2,002 5,512 36 2,642 292 13 88 101 330 1,557	132 60 1,963 5,801 21 2,484 296 20 72 4 359 1,490	117 00 1.553 6,401 33 2.687 501 21 89 0 150 1,579	4,242 3,037 71,948 247,295 1,386 111,347 14,993 3,173 11,827 14,472 49,885
thevrolet 3. M. C. J. M. C. J. M. C. J. M. C. J. J. M. C. J. J. M. C. J. J. M. C. J. M. M. C. J. M. M. C. J. M. M. C. J. M. M. C. J. M.	104 60 1,959 5,330 32 2,749 328 2 71 320 346 1,396	95 90 2,002 5,512 36 2,642 292 111 88 101 330 1,557 88	132 80 1,963 5,901 2,1 2,484 295 20 72 4 359 1,490 89	117 60 1,553 6,401 33 2,687 501 21 89 0 150 1,579	4,242 3,037 77,946 247,295 1,396 111,347 14,933 648 3,173 11,827 14,472 48,855 4,576

### \*--Prior to week ending Sept. 1, 1956, Rambler production was included with Nash and Hudson.

### Ford Kansas City Plant Is Sold To Armco Steel

Old automobile assembly plants, many of them unsuitable for advanced manufacturing techniques, continue to fade into oblivion as more modern structures replace them. By next spring, car and truck production at Ford's Kansas City plant, the division's oldest branch plant, will be halted as all operations are moved to a new plant in Claycomo, north of Kansas City.

Built in 1952, and used until recently for the production of B-47 bomber wings, the Claymoco plant eventually will assemble cars and trucks for the areas formerly served by the old plant. The old plant, used by Ford since 1912, has been sold to Sheffield Steel, a subsidiary of Armco Steel Corp.

The latter will use it for bolt and nut production equipment as soon as Ford vacates it early next year.

### Hercules Galion To Enlarge Capacity of Kingham Trailer

Hercules Galion Products Corp. plans to double capacity of the Kingham Trailer Co. plant at Louisville. Hercules Galion bought Kingham Trailer Co. recently at a reported price of \$1 million.

The Kingham operation produces trailers, aluminum and steel bodies, and axles. Hercules Galion makes several lines of truck bodies, hydraulic hoists and lift tail gates, plus cement and fertilizer spreaders, concrete mixers, burial vaults, and popcorn machines. It has four plants in Ohio and one each in Denver, Col., and St. Louis, Mo.

### Greyhound Drops Its Litigation Against GM; Orders More Buses

In a complete "about-face", Grey-hound Corp. not only has dropped plans for a multi-million dollar suit against GM charging mechanical failures in Scenicruiser buses, but has placed an order for 500 new intercity coaches with GMC Truck and Coach Div. Settlement of the issue came as no surprise to those familiar with GM's policy of standing back of its products.

# AND AVIATION INDUSTRIES



**BUDD ATOM HANDLER** 

Interior view of new Budd radioisotope handling facility (see Al, Oct. 15, p. 39) shows the business ends of the master-slave manipulator. Closed-circuit television camera is for close observation of work done with radiosotope materials. The various items on floor are all used in processing isotopes of Cobalt 60, Thulium, Iridium and others.

# ASBE Technical Meeting Has Variety of Papers, Exhibits

The 11th annual technical meeting of the American Society of Body Engineers, held in Detroit last month, was easily one of the best attended in recent years.

The program was timely and touched upon a variety of interests ranging from the structure and sealing of four-door hardtops to "dream" cars, safety, and body design. One session, devoted to the uses of light metals, had papers from Reynolds Metals and Alcoa. The closing session dealt with stainless steel for structural parts and a discussion of the sliding roof by Otto Goller.

An interesting paper by R. G. Whittemore, of Pittsburgh Plate Glass Co. described some of the long-range projects on future carbody glass, including special coated materials for the roof panel. It was hinted that some day we might see glass with the properties of a transparent steel.

The exhibits were noteworthy with 27 suppliers participating. They showed products and new developments of special interest to body engineers.

# TABLOID

General Electric Co. expects to spend \$500 million on plant expansion and modernization in the next three years.

Black & Decker Mfg. Co. has opened a new warehousing, service, and sales subsidiary in Brussels, Belgium.

Vertol Aircraft Corp.'s board of directors has approved broadening discussions of a merger with Northrop Aircraft, Inc. . . . Stockholders of American Tractor Corp. and J. I. Case Co. will vote Nov. 15 on a proposed merger between the two companies.

Brandes Press Co. will erect a new plant in Lake City, Pa., for manufacturing its complete line of automatic stamping presses.

Baldwin - Lima - Hamilton Corp. has opened a new district sales office at 15800 West McNichols Rd., Detroit, Mich.

Martin Co. is now producing the Lacrosse surface-to-surface guided missile for the Army Ordnance Corps.

. . .

C. O. Bartlett & Snow Co. has moved its Grindle Div. to Cleveland, O.... Advance Stamping Co. has moved its Detroit plant to expanded quarters at 12025 Dixie Ave.

Kaiser Aluminum & Chemical Corp. will add extensive facilities for the production of aluminum plate to the sheet and foil rolling mill now under construction at Ravenswood, W. Va.

Society of Automotive Engineers has moved its headquarters to 485 Lexington Ave., New York 17, N. Y.

. . .

Caterpillar Tractor Co. has formed a new Foreign Trade Group and two new domestic divisions—Manufacturing, and Parts and Service.

Christensen Machine Co. has taken over the Miehle-Dexter Supercharger Div. of Dexter Folder Co.

Douglas Aircraft Co. is building new facilities costing \$5 million to meet the expanding needs of the DC-8 jet transport and missiles programs at its Santa Monica, Calif., plant.

Pressurform Co. of Swarthmore, Pa., has developed what is said to be a new low-cost process for molding fibrous glass reinforced products using high-speed mass production techniques.

. . .

Ethyl Corp. has disclosed plans for a new antiknock compound manufacturing plant near San Francisco, Calif. . . . Olin Mathieson Chemical Corp. plans construction of a modern \$1.5 million plant for the formulation and packaging of automotive anti-freeze at Mapleton, Ill.

B. F. Goodrich Co.'s Aviation Products Div. has developed new type aviation disc brakes, incorporating sintered metal linings and newly perfected automatic adjustment, for the Lockheed Electra.

Du Pont Co. is considering building a sodium and chlorine production unit as an addition to its existing plant at Memphis, Tenn.

. . .

Directors of Hooker Electrochemical Co. and Oldbury Electro-Chemical Co. have approved an agreement for consolidation of the two companies.

# Mews of the AUTOMOTIVE

### 1956 RETAIL CAR SALES BY PRICE GROUPS\*

### Number of Cars

		Au	pust			Eight	Months	
	1956		190	55	195	6	195	5
Price Group Under \$2,000 . \$2,500 . \$2,501 to \$3,500 . Over \$3,500	Units† 86,284 317,399 133,435 22,792	% of Total 15.41 56.69 23.83 4.07	Units† 388,838 204,147 63,115 17,230	% of Total 56.45 31.25 9.66 2.64	Units† 748,211 2,284,191 933,644 167,962	% of Total 18.10 55.25 22.59 4.08	Unite† 2,643,523 1,510,281 530,213 136,994	% of Total 54.83 31.33 11.00 2.84
Total	559,910	100.00	653,330	100.00	4,133,908	100.00	4.821.011	100.00

### **Dollar Volume of Sales**

	August				Eight Months				
1956		6	1955		1956		1955		
Price Group Under \$2,000 \$2,001 to \$2,500 \$2,501 to \$3,500 Over \$3,500	Dellare \$169,301,324 679,888,826 364,819,856 98,275,292	% of Total 12.90 51.81 27.80 7.49	Dollars \$700,834,041 476,632,114 176,884,824 69,074,296	% of Total 49.24 33.48 12.43 4.85	Dollara \$1,464,787,024 4,909,379,888 2,574,575,577 719,963,384	% of Total 15.15 50.77 26.63 7.45	Dollars \$5,018,775,498 3,525,119,270 1,498,485,921 555,867,877	% of Total 47.36 33.26 14.14 5.24	
Total	\$1,312,285,088	100.00	\$1,423,425,276	100.00	10,668,705,653	100.00	\$10,598,028,563	100.00	

\*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

### \$18 Million Missile Contract Will Be Awarded to Chrysler

Chrysler Corp. continues to be an important participant in the Government's guided missile program. Now a major producer of the Redstone guided missile, the corporation is in line for an additional large contract of \$18 million, for guided missile work.

Details of the type of missile that will be produced under the latest contract are not known. It is understood however, to be the Jupiter ballistic missile, which was engineered by Chrysler.

### Willys Extends Certain Benefits To Old Kaiser Motors Workers

A new program has been formulated by Willys Motors to extend a number of benefits to former Kaiser Motors employes who were covered by a welfare fund, set up in 1948 by the UAW and Kaiser Motors. One of the provisions of the new program will entitle former Kaiser employes to a comprehensive physical examination, even though they already may be covered by a health insurance plan at their present place of employment.

The program is not designed to duplicate any hospital, medical, or insurance benefits which former Kaiser workers may now be enjoying with other companies, but rather to provide supplementary benefits to which they were entitled when they were laid off from Kaiser Motors. Other benefits also are being considered under the new Willys plan.

# Car Production for 1956 May Not Hit Six Million

It now appears that automobile production for the 1956 calendar year may fall short of the estimated six-million mark. Production could end up anywhere from 200,000 to 300,000 units under that figure. If so the industry would have a grand total of 5.7 million to 5.8 million cars for the year. Thus 1956 would go down in the records as the fourth best year, and not the third best, as the industry had hoped until a few weeks ago.

A slow start on getting into production on the 1957 models appears to be the biggest reason why output may remain under the six-million mark. Through Oct. 13, only 4.37 million cars had been turned out, leaving 1.62 million to be produced in the remaining 11 weeks of the year to come near the six-million mark. Car companies would thus have to build an average of 148,000 cars a week for the remainder of the year. It would mean a return to a production pace comparable to the record rate of last January.

### Automated Screw Hardening Capacity Increased at SPS

Standard Pressed Steel Co., Jenkintown, Pa., has completed its second automated line for the heat treatment of precision threaded fasteners. Its automatic heat treating capacity has thus been raised to more than 100,000 screws per hour.

The second line was built, as was the first, by Surface Combustion Corp. around a 30-ft long radiant-tube hardening furnace. Except for a few extralarge sizes made on special order, the two lines can heat treat all of the standard and aircraft alloy steel fasteners made at SPS.

Mechanically, the automated giant conveys batch-weighed runs of fasteners through seven stages of carefully timed washing, hardening, quenching, tempering and rust-proofing operations.

At the end of the line, the fasteners are ready for packaging and shipment. A complete run takes about two hours, with variations dependent upon the size and type of fastener in each run.

Hardening is carried out in an oxygen-free controlled gas atmosphere that eliminates oxidation, decarburization and sooting of the fasteners under treatment. This produces clean fasteners with a uniform hardness.

Several improvements were made in the second line as a result of experience gained by SPS in working for three years with the first. The temperature of the tempering furnace (which follows the hardening and quenching operations), has been raised from 1100 F to 1250 F.

Bearings in the hardening furnace of the new line are oil-cooled; those in the first line were air-cooled. The new line is automatically lubricated every eight hours.

### Acrylic Paint Now Offered In Six Colors By Oldsmobile

Acrylic resin lacquer finish, introduced by General Motors on some 1956 cars, will be offered in wider color selections on 1957 models. Oldsmobile has announced that it will add four more colors to bring to six the total number of hues which will be available at extra cost.

# AND AVIATION INDUSTRIES

# 1957 Cars To Get Big Send-off Through Two Large Shows, Ads

Unquestionably the 1957 lines of automobiles will get one of the biggest send-offs in years judging by promotional efforts now under way. Two large automobile shows, coupled with hard-hitting advertising efforts, will spotlight the cars in full glory.

The National Automobile Show, to be held in New York in December after a lapse of 16 years, certainly will be an important stimulus to merchandising of the 1957 models, and public reaction will be watched with high interest. The Chicago show in early January will lend another boost.

### GE to Sponsor Symposium On Jet Overhaul Problems

More than 100 representatives of the military services and aviation industry are expected to attend a symposium on jet engine overhaul problems at the General Electric Co. plant at Evendale, O., on Nov. 14, 15, and 16.

The program will include presentation of technical papers by military and industry personnel.

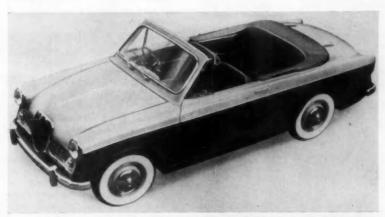
# Jackson Scheduled to Talk On Indianapolis Car Design

Robert T. Jackson, sales engineer for Perfect Circle Corp. and special AI Indianapolis Race correspondent, is giving his annual talks again this year on "Indianapolis Racing Car Design." He is scheduled to appear Nov. 8 at Pennsylvania State Univ., State College, Pa., and at Williamsport, Pa., on Feb. 4; both occasions are SAE section meetings.

### Chevrolet Price Boosts Range From 2.1% to 9.1%

Prices on 1957 Chevrolets have been increased from between 2.1 per cent to 9.1 per cent. The average boost amounts to 6.1 per cent, and the largest increases have been posted on the lowest-priced series.

The largest price increase of \$166, appears on the Bel Air four-door standard sedan, while the two-door hardtop has been increased \$74 and the four-door hardtop \$85. Prices of



### ROOTES INFLUENCE SEEN IN NEW SINGER VEHICLE

The Singer Gazelle is the first result of the British Rootes Group's acquisition of Singer at the end of last year. Produced as a convertible and a four-door hardtop, it combines many of the body and chassis components of the Sunbeam Rapier and Hillman Minx with the tour-cylinder engine and interior refinements of the Singer Hunter. The 91.36 cu in. power plant with overhead camshaft develops 52.5 bhp at 4500 rpm, and drives through a four-speed transmission, according to specifications.

fuel injection and Chevrolet's new Turboglide automatic transmission, to be offered as optional equipment, were not available at presstime.

Some slight price reductions have been made on accessories. Power steering was reduced \$20 to \$65, power seats \$5 to \$40, and power windows \$5 to \$95. Prices on the V-8 engine, regular automatic transmission, and power brakes remain unchanged.

### CHEVROLET PRICES\*

1957 \$2,064 2,128 1,976 2,037
2,128
1,976
2,00
2,008
2,056
1,900
1,937
1,948
1,783
1,831
1,000
2,490
2,325
2,210
2,310
2,160
2,072

### Thompson To Spend \$10 Million On New Test Operation In Va.

A new facility, designed chiefly for testing fuel systems and auxiliary power systems for rockets and missiles, will be constructed by Thompson Products, Inc., near Roanoke, Va., at an estimated cost of \$10 million. Consisting of 14 buildings, the project is not expected to be completed until about 1961.

### Correction

In a recent article on general characteristics of 1957 Chrysler Corp. cars (see AI, Oct. 1, p. 48), it was reported that brakes had been reduced in diameter to accommodate the 14-in. diam wheels used across the line.

Chrysler Corp. has since advised that it has fitted its Chrysler and De Soto "total contact" center-plane brakes into 14-in. wheels that are standard on all of its 1957 lines without reducing the diameter of the brakes or changing the basic design of the brake mechanism. The same braking efficiency is thus maintained.

Height of a rib on the outer surface of the drum has been reduced, and the drum itself is slightly wider than for 1956. Lining width remains the same at 2½ in., as reported in the original story.

# Men in the News



E. W. Bliss Co. — Albert S. Burgoyne has been named vicepresident in charge of manufacturing.



Eaton Manufacturing Co.—John C. Virden has been elected president, effective Jan. 1.

American Motors Corp.—V. E. Boyd has been promoted to field sales manager, and James W. Watson has been named sales manager for the Metropolitan car.

Ford Motor Co.—Richard E. Krafve was appointed a vice-president and a member of the administration committee.

American Brake Shoe Co.—John S. Hutchins has been elected executive vice-president, and Charles M. Ruprecht was named to succeed him as president of the National Bearing Div.

Coolidge Corp.—D. D. McKillop was elected vice-president of operations, and John R. Garwood was elected secretary-treasurer.

Oldsmobile Div., General Motors Corp.—John B. Beltz has been appointed assistant chief engineer in charge of body and sheet metal design and engineering standards, while T. R. Tompkins has been advanced to experimental engineer.

Westinghouse Air Brake Co., Industrial Products Div.—E. L. Holbrook was appointed sales manager.

Norton Co.—Theodore J. Englund has been appointed manager of industrial engineering; Paul L. Lantz, assistant manager of industrial engineering; and William F. Watts and William P. Densmore, factory manager and chief industrial engineer, respectively, of the Refractories Div.

Monroe Auto Equipment Co. — William D. McIntyre has been elected vice-president and general manager.

Borg - Warner Corp., Ingersoll -Humphryes Div.—G. W. Kelch was appointed president.

Morse Chain Co.—Elmer D. Robinson has been appointed director of manufacturing.

U. S. Rubber Co.—H. W. Kriete and T. V. Horrigan have been elected assistant treasurers.

Eaton Manufacturing Co., Cleveland Heater Div.—Ferd W. Fisher was appointed chief engineer of the heating and engineering section, and C. M. Heller was named chief engineer of accessories and special products.

Thompson Products, Inc. — Arthur J. Davidson, Jr., has been named associate director, Staff Research and Development, Automotive, and James E. Yingst has become manager of the department.

Joseph T. Ryerson & Son, Inc. — William J. Cleary was made manager of tubular steel products and cold finished steel bar sales at the Philadelphia, Pa., steel service plant.



Ford Motor Co. — James J. Nance has been elected vice-president of marketing.

American Motors Corp., Government and Fleet Sales Div. — E. E. Stephenson has been named manager of the Midwestern Div., and R. F. Barnett has been chosen manager of the Western Div.

Lincoln Div., Ford Motor Co. — William H. Reynolds is now manager of the Administrative Services Dept.

AC Spark Plug Div., General Motors Corp.—Donald P. LeGalley is now scientific staff consultant, and Sherman O. Pratt has become comptroller.

Greer Hydraulics, Inc.—Archie N. Colby has been appointed general sales manager, and B. R. Teree has been named chief engineer.

Haynes Stellite Co.—Charles G. Chisholm has been named general sales manager.

Motch & Merryweather Machinery Co. — Richard W. Banfield has been elected president and chief-executive.



Campbell, Wyant and Cannon Foundry Co.—Richard L. Lindland has been appointed president.



Allison Div., General Motors Corp.

—William G. O'Callaghan has been made general superintendent of production for Aeroproducts operations.

(Turn to page 136, please)

# Necrology

Theron Bradshaw, 65, former chief engineer of the Replacement Div. of Perfect Circle Corp., died Oct. 3, at Claremont, Calif.

Charles E. Bunting, 70, chairman of the board of Bunting Brass and Bronze Co., died recently, at Toledo, O.

Edgar J. Hunt, 63, retired Kaiser-Frazer executive and former Chrysler aide, died recently, at Port Huron, Mich.

Lawrence D. Bell, 62, founder and board chairman of Bell Aircraft Corp., died Oct. 20, at Buffalo, N. Y.

George W. Cooke, 87, general superintendent of the former Pierce-Arrow Motor Co., died Sept. 27, at Buffalo, N. Y.

Edward A. Selkirk, 80, former president of the old American Body Co., died Sept. 29, at Buffalo, N. Y.

Sidney G. Down, 80, a former first vice-president of Westinghouse Air Brake Co., died Oct. 7, at San Diego, Calif.





Combination spar and skin miller operating in Lockheed plant. Texaco Soluble Oil emulsions are used exclusively in these operations.

# How Lockheed keeps production on schedule and reduces costs

TO KEEP its metalworking operations on schedule and its costs in line, Lockheed uses Texaco Cutting, Grinding and Soluble Oils at its Marietta plant. For example -

Texaco Soluble Oil emulsions are used on all spar and skin milling operations. The resulting improved performance of the millers (even at cutting speeds above 5,000 s.f.p.m.), the greater cleanliness, the substantially longer tool life-all add up to on-schedule production and lower unit costs.

There is a complete line of Texaco Cutting, Grinding and Soluble Oils to help you do all your machining better, faster and at lower cost. A Texaco Lubrication Engineer will gladly help you select the proper

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The Texas Company, 135 East 42nd Street, New York 17, N. Y.



# Which Through-Hardening Grade of Alloy Tubing Is Best for You? Typical Microstructures (at 1000 X) and Hardnesses, 4140 Steel

# ... B&W Can Supply Them All

For applications of mechanical tubing that require high strength, ductility, and resistance to impact, the medium-carbon, through-hardening steels are particularly suitable. A correlation of the properties of each available grade with your product specifications will help you determine the grade most suitable for your operation. Listed are the medium-carbon alloy steels typical of those that can be heat-treated to meet a broad range of mechanical properties. These steels all contain alloying elements introduced to provide a desirable combination of strength and ductility and to promote ease of heat treatment. In some grades the alloying elements also provide resistance to softening at higher tempering temperatures.

Tubing of these grades may be hot forged without difficulty by conventional methods, and in the softened state is readily machinable—a good indication of the workability common to all the medium carbon through hardening.

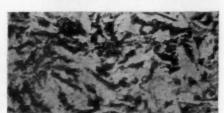
In the application of alloy tubing of these steels, it is often possible to use alternate grades without loss of desirable mechanical properties. You'll find Mr. Tubes—your link to B&W—always on call and invariably helpful in any discussion of your tubing requirements. You'll find B&W Bulletin TDC-141 helpful, too. Send for your copy today. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



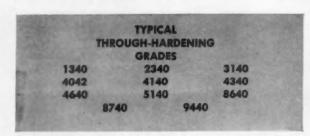
Hot Polled - Hardness 285 RH



Normalized 1650 F - Hardness 302 BHN



Normalized 1650 F and drawn at 1250 F far 1 hour — Hardness 217 BHN





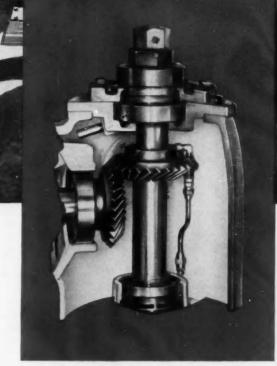
Seamless and welded tubular products, seamless welding fittings and forged steel flanges—in carbon, alloy, and stainless steels

# Turning POWER into WATER for a million THIRSTY ACRES



Here is work-hard work-needed work, for America's huskiest pumps. Here, where crops and livelihood depend upon them, you will find pumps engineered for the most reliable performance and endurance. One of the strongest points we can make about our gear drives is that they are specified as original equipment in the irrigation pumps of many manufacturers.

What is your power transmission problem? Why not write?



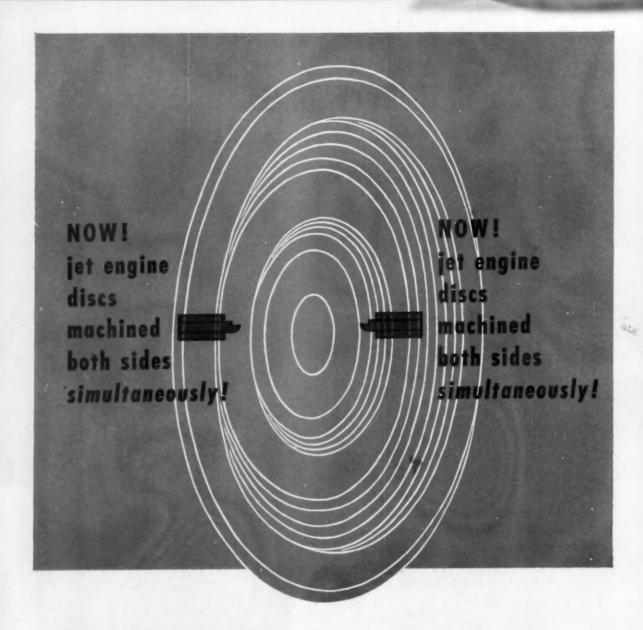
Cut-a-way shows gears of our manufacture in a typical heavy-duty irrigation pump.



FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS GEAR-MAKERS TO LEADING MANUFACTURERS

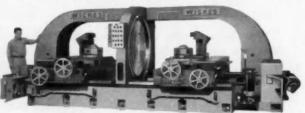
otive Gear Works, inc.

MANUFACTURING COMPANY



WICKES, pioneers of the center drive principle, announce a center drive profiling lathe specifically designed to machine both sides of jet engine discs at the same time • Due to equalized pressure of tools on each side of disc, flatness, parallelism and concentricity are obtained that were never before possible • Single chucking eliminates stack up of tolerances • Controlled by 360° tracer

- Constant cutting feet per minute and constant feed per revolution produce a highly superior finish
- Stainless steel or titanium are readily machined in this set-up.



FOR MORE DETAILED INFORMATION ON THIS MACHINE WRITE US TODAY.

WICKES MACHINE TOOL DIVISION . THE WICKES CORPORATION . SAGINAW, MICHIGAN OVER 100 YEARS' EXPERIENCE IN SOLVING PRODUCTION PROBLEMS

# SPEED KING

the only valve guaranteed against coil burnout for life

Now—for the first time—you can eliminate coil burnout, the major source of valve trouble. That's because Speed King valves are guaranteed against coil burnout for the life of the valve. Unique design of Speed King valves minimizes inrush and holding current in solenoid coils. Furthermore, coils are encased in molded epoxy resin . . . proof against moisture, oil, dust and vibration.

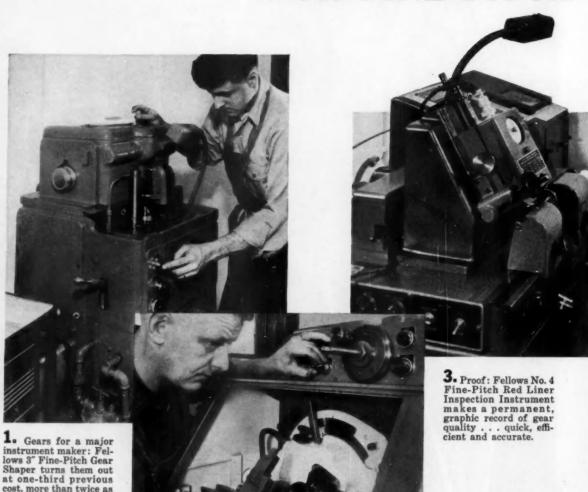
coils, Furthermore, coils are encased in molded epoxy resin . . . proof against, moisture, oil, dust and vibration. And the Speed King gives you many other "plus" advantages, too. Users report Speed Kings regularly operate over 20 million cycles. In addition to being guaranteed dependable, Speed King valves are built to JIC standards ... are compact ... easily adapt to any requirements for air, hydraulic or vacuum applications ... have full line of optional attachments ... and are available for immediate delivery from stock.

Check your valve requirements critically. Check performance, features, materials, guarantee, delivery. Compare—and you'll specify Speed Kings. Valvair Corporation, 454 Morgan Avenue, Akron 11, Ohio.



Representation in Boltimore • Birmingham • Boston • Charleston, W. Va. • Chicago • Cleveland • Cranford, N. J. • Dayton • Derver Detroit • Fureko, Calif. • Houston • Kansas City, Mo. • Kenmore, N. Y. • Logansport, Ind. • Louisville • Minneapolis • S. Posadena Philadelphia • Pitisburgh • Portland, Ore. • St. Louis • Seattle • San Francisco • Syracuse • Montreal • Toronto • Vancauver

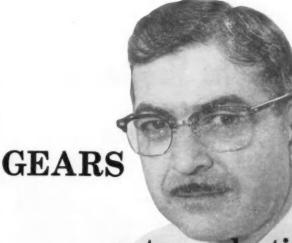
# FELLOWS EQUIPMENT FOR FINE-PITCH



cost, more than twice as fast: 120 finished gears per hour, compared to old rate of 55.

2. Extra precision: Fellows No. 4 Fine-Pitch Gear Shaving Machine makes good gears better with finer finish, minimum backlash, tighter tolerances where desired.

THE **PRECISION** LINE



cuts production time up to 50%

# at ALLING-LANDER!

all known for their excellent service in producing ument type gears of close tolerance, the Alling-Lander Company, Inc. of Sodus, New York has cut gear production time up to 50%, and unit costs more than half, by using the latest Fellows equipment in their fine-pitch gear department.

With Fellows integrated line of fine-pitch machines and inspection instruments, Alling-Lander gets high-speed production with complete control of gear quality. The Fellows 3-inch Fine-Pitch Gear Shaper is fast and accurate. Outting speeds run up to 2000 strokes per minute and vierances can be held to 0.0005". Close-limit tolerances are curther assured by finishing on the No. 4 Fine-Pitch Gear Shaving Machine. Inspection on the No. 4 Fine-Pitch Red Liner provides chart-recorded proof of gear accuracy.

Fellows Precision Line also includes other types of gear inspection instruments and a number of models of Gear Shapers for cutting spur and helical gears of larger sizes. Your Fellows representative can give you information about any of them. And, ask him about the Fellows Plan for deferred payment too. Write, wire or phone any of our offices.

THE FELLOWS GEAR SHAPER COMPANY THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 319 Fisher Building, Detroit 2
5835 West North Avenue, Chicago 39
150 W. Pleasant Avenue, Maywood, New Jersey
6214 West Manchester Avenue, Los Angeles 45

Ellows Gear Production Equipment

# TorqueFlite Transmissions Produced in Fully Automated Plant

Thas become customary to expect every new plant placed in operation in our industry to represent a major advance in equipment and methods. This is certainly true of the Kokomo (Indiana) plant of Chrysler Corp., which is producing the three-speed TorqueFlite automatic transmissions for 1957 Imperial, Chrysler, Dodge, and DeSoto cars.

As will be shown later, not only does this plant exhibit machine tool equipment of latest design but it is particularly outstanding in the development of automation throughout. Moreover, the automation is neither routine nor commonplace; it encompasses complete automaticity of gear production lines, of automatic screw machines, large vertical broaching machines, tooth chamfering machines, and newly designed

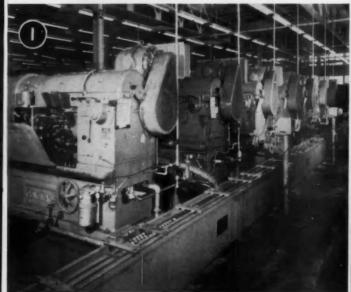
internal shaving machines for which automation is a decided first.

This high degree of automation, together with the many new items of equipment that represent "firsts" in the automotive industry, make this plant one of the most impressive in its field.

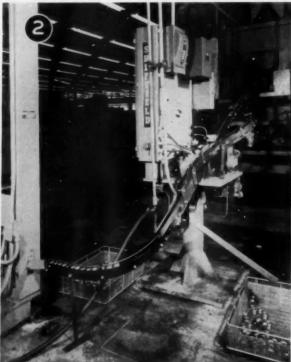
Boasting 850,000 sq ft of productive floor space, the plant is divided into three basic areas to separate the handling of steel, cast iron, and aluminum parts. Not only does this segregate the different kinds of operations, it also simplifies the segregation of the different kinds of chips for salvage. One of the noteworthy features of the arrangement is the provision of a self-contained central cutting fluid system—which employs a soluble oil mixture—for the entire plant.

# VIEWS ON THE PLANET GEAR LINE

Start of planet gear line. Battery of seven Conomatics are seen feeding automatically into Lamb conveyor in foreground. Chutes carrying the turned blanks may be seen emerging from the side of each of the automatics.



After planet gear blanks leave the automatics, they go through the washer in the background, then through the Sheffield gaging machine in the foreground. Accepted blanks are routed down the chute to the left to the elevator.



# PART 1

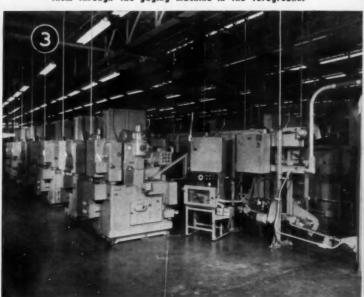
# By Joseph Geschelin

The most impressive transfer machine line is the 600-ft line for machining the transmission case. As described later, it is completely automatic in operation. There are two other transfer lines: one for the aluminum extension, the other a Krueger-Barnes machine for gun-drilling the bore through shafts and drilling radial oil holes.

Prize exhibit is the fully automated line-up of equipment for producing planet gears, certainly one of the first of its kind in the industry. Other outstanding examples are: complete automaticity of automatic screw machines; cross-drill and scalloping of parts in Conomatics; and the National Acme-Gridley tooling that combines cross-drilling, milling, and sawing in a high production screw machine operation.

Great progress is being made in new gear plants in the automatic inspection of parts and the employment of feedback devices to compensate for tool wear in the machines. Perhaps the most dramatic advance in this plant is in the introduction of the Illinois Tool

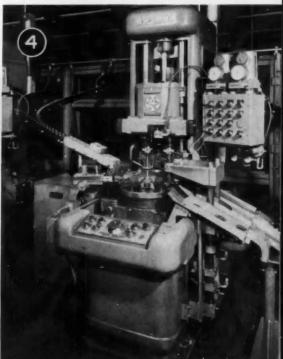
Here is the battery of Fellows gear shapers on the planet line. Gear blanks reach each machine via the chute leading from the upper conveyor in the background. Finished blanks come out of each machine on the lower chute, which carries them through the gaging machine in the foreground.

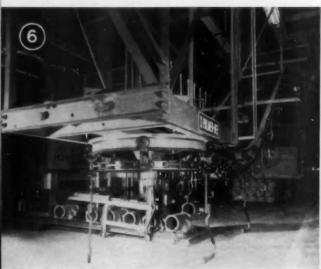




The Illinois Robot checking machine for planet gears. Gears feed in from the chute at the right in the background. Inspected gears are automatically segregated and issue from the channels in the left background. Accepted gears load into the tote boxes ready for loading on arbors for heat treat.

One of the Micromatic, two-spindle honing machines for honing the planet gear bore. Blanks reach the machine via the two-channel chute at the left and are ejected at the right.





This marks the beginning of the transmission case line. The station seen here is directly in front of the annealing furnace and the Kolone machine. As the cases come in from the foundry they are picked off the gravity roller convoyor in the foreground, hooked automatically into the carrier on the monorail and are ready for the trip through annealing and Kolone treatment.

### VIEWS ON THE TRANSMISSION CASE LINE

Works robot inspection machine that checks planet gears. It checks for size, runout, tooth spacing, lead, and gear noise and nicks, segregates the gears and distributes them into suitable tote boxes. It has been aptly dubbed the "juke box."

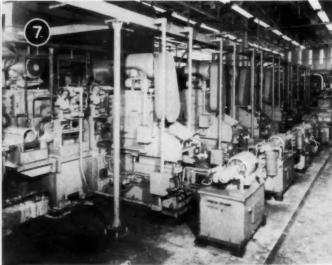
Finally, it may be noted that important tool economy has been effected by the use of "throw-away" cemented-carbide tools, one of the latest devices of the tool engineer.

A major advance has been made in the aluminum department by the use of Heald precision face milling machines equipped with specially designed industrial diamond tooling. When used on the faces of valve bodies which require close tolerances on flatness and surface finish, diamond tools promise to eliminate the conventional methods of surface lapping.

# Planet Gear Line

From the standpoint of automaticity the integrated line for producing planet gears is probably one of the most advanced of its kind in the industry. In fact, the only break in the continuity of this fully automatic line comes at the point of heat treating where it is necessary to stack the parts for loading into the furnaces. Following heat treatment, the parts again have to be manually handled to initiate the start of "hard" finishing operations.

This distinctive gear line begins with a group of seven Conomatics that produce the gear blanks. Automation begins with the Conomatics. As finished blanks



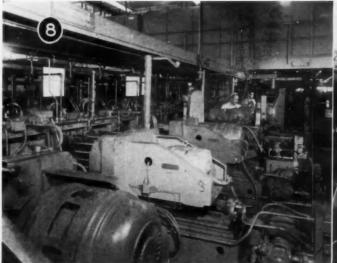
Close up of the first bank of Fitchburg equipment integrated in the transmission case line.

drop out of the machine they are guided by a gravity chute that leads directly to a belt conveyor. The conveyor carries the blanks to a Blakeslee washer, where they are given a cold alkali wash. The cold or room temperature wash was preferred since the next step is gaging of the blank. Blanks enter the Sheffield gaging machine via the magazine chute. They are inspected for bore size, roundness, taper—bore size being held to a tolerance of 0.001 in. whereas roundness and taper must be held to a tolerance of 0.00026 in. The gaging machine not only inspects, it also segregates the parts, permitting only acceptable blanks to proceed to the Lamb storage cabinet.

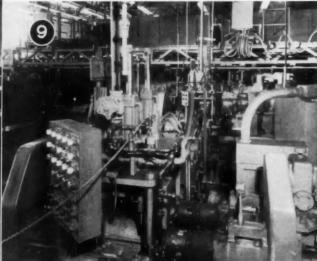
One of the secrets for the success of this highly mechanized department is the smooth functioning of the Lamb storage cabinets and automation devices. The storage cabinets installed at Kokomo hold approximately 3500 pieces at a time. If the cabinet becomes full and if there is a stoppage ahead, the control mechanism will automatically stop the machine and conveyor system immediately behind the full cabinet to prevent any further accumulation of parts.

Going back to the first Lamb cabinet, the flow of blanks now is directed to the Lo-Swing Imp, which is fitted with automatic loading and unloading. Here the blank is faced on both sides to assure squareness and parallelism, and the ID is chamfered on both sides. Blanks are ejected through the chute and move to the next storage cabinet.

From this point the blanks are transferred onto an endless chain conveyor for transport and distribution to the battery of 14, No. 4 Fellows gear shapers. The latter are fitted with automatic loading and unloading to integrate them with the automatic handling system. As the gears come out of the gear shaper they enter a special automatic Fellows gaging machine, mounted adjacent to each gear shaper. Here the blanks are subjected to inspection for size and runout, as well as



Barnesdril transfer machine that is tied in as a section of the transmission case machine line.



Perspective of one section of Ex-Cell-O special transfer machines on the transmission case line.

pitch diameter. Accepted gears then move directly into a Modern BurrMaster for chamfering gear teeth on one edge, then drop by chute to the lower level of the conveyor.

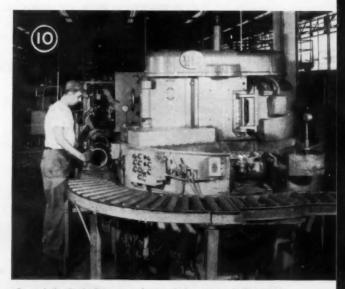
Accepted gears traveling on the lower level of the conveyor move to a Lamb cabinet, thence by elevator to the next conveyor section which feeds them directly to a battery of seven Fellows gear shavers. These are completely automatic in action, including automatic loading and unloading. Besides shaving the gear teeth, they are arranged to chamfer the OD of the gear as well.

This is the last operation in the "green." At this point the gears are loaded in stacks of 10 on arbors and transported to the heat treat. Here the gears are gas carburized, oil quenched, then shot blasted, removed from the arbors and loaded into a Lamb hopper.

From the hopper, the gears move to an elevator, then are directed by chute to a Sheffield chamfer grinding machine. Next they are conducted into a Micromatic surface honing machine, fitted with a double wheel in which both faces of the gear blank are honed to a fine surface finish.

Again the parts are directed into a storage cabinet, thence to a conveyor for transport to a group of four Micromatic two-spindle, vertical honing machines for honing the bore. The honing machines not only are fully automatic in cycle, they are also equipped with automatic gaging and automatic compensation for size. The bore is held to a tolerance of 0.0005 in. for size; taper and out-of-round are held to a limit of 0.0001 in.

Following honing the gears are elevated, then directed by chute to feed into an amazing gear inspection machine, the new Illinois Tool Works gear checker. In one fast cycle, it combines the functions of checking for size, runout, tooth spacing, lead, and noise and nicks. As the parts are run through they

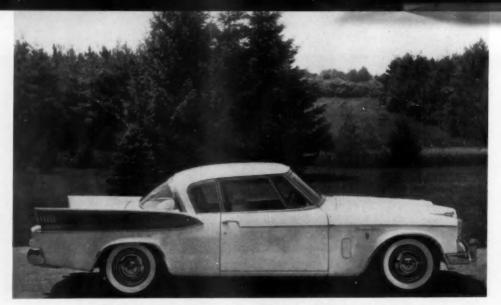


One of the Besly Bowen surface grinders for grinding transmission case pan rail to a surface finish of 40-microinch.

are segregated and ejected through one of a group of chutes which feed the rejected gears into baskets, and direct acceptable gears to an elevator. From there, they are fed by gravity to the assembly department.

### **Transmission Case Line**

The 600-ft long transfer machine line for the transmission case is composed of a variety of makes and types of equipment. The case line is fully automatic in operation through the action of electric and electronic controls, transfer conveyors, automation (Turn to page 116, please)



The Golden Hawk is powered by a 289 cu in. supercharged engine

# STUDEBAKER'S NEW MODELS

# Include Golden Hawk with Supercharged Engine

Prosident Classic sedan



TUDEBAKER'S new line of cars will consist of 14 sedans and four station wagons in the President V-8, Commander V-8, and Champion six-cylinder series. The 1957 Hawk line, covering three price brackets, will consist of the Golden Hawk hardtop with a supercharged 289-cu in. V-8 engine, Silver Hawk coupe powered by a 289-cu in. V-8 and the Silver Hawk six with a 185.6-cu in. in-line engine.

Power plants which will be used in other models are: the Sweepstakes 289-cu in. V-8 for the President series; the 259-cu in. V-8 for the Commander series; and the 185.6-cu in. six-cylinder engine for the

Champion series. Compression ratio in all V-8s is 8.2 except Golden Hawk which is 7.8.

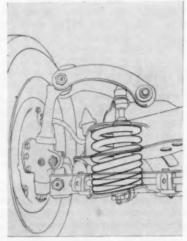
Two engineering developments are being brought out by Studebaker. They are: 1. Variable rate control of front-coil springing, achieving the advantages of stiffer springing action for smooth negotiation of rough road surfaces and softer springing for better boulevard riding. Standard on all sedans and on Hawk models, the purpose and effect of the new spring development is to give the same degree of soft ride with one to five passengers as is obtained by conventional coil springs only with a heavy load. Principle

### STUDEBAKER ENGINES -- 1957

Sedans	Horsepower	Torque (lb ft)	Displacement cu in.
President Classic Series	225 210 225*	305 at 3000 300 at 2800 305 at 3000	289 289
Commander Series	180 195*	260 at 2800 265 at 3000	259.2
Champion Series	101	152 at 1800	185.6
Station Wagons			
Broadmoor 4-door	210 225*	300 at 2800 305 at 3000	289
Provincial 4-door	180 195*	260 at 2800 265 at 3000	259.2
Parkview—2-door	180 195*	260 at 2800 265 at 3000	259.2
Pelham-2-door	101	152 at 1800	185.6
Hawks			
Golden Hawk	275**	333 at 3200	289
Silver Hawk V-8	210 225*	300 at 2800 305 at 3000	289
Silver Hawk 6	101	152 at 1800	185.6

<sup>\*\*</sup> Supercharger standard equipment.

\* With optional power kit.



New variable rate front coil spring

is that individual coils compress one by one at an unequal rate, rather than at the same rate.

2. A twin-traction rear axle (optional equipment on all V-8 models) which automatically divides engine power between the rear wheels in the proportions necessary to stop wheel slipping and spinning under adverse driving situations such as mud, snow and ice. Up to 80 per cent of engine power driving force is transmitted to the rear wheel with the better traction.

The supercharged Golden Hawk has up to 15 per cent better performance than in 1956 according to Studebaker engineering tests. The McCulloch supercharger, a five-pound-boost, full-pressure system, rams about a 30 per cent greater amount of fuel and air mixture into the combustion chamber, resulting in higher explosion pressures than under normal operating intake vacuum. The engine will require premium fuel. The supercharger is driven through a variable rate pulley which produces maximum power during acceleration while permitting normal fuel economy at cruising speeds.

Adding to the performance potential with the new supercharged Golden Hawk is the improved front and rear weight distribution through the use of the lighter Studebaker 289-cu in. V-8 engine, and, when equipped with automatic transmission, through use of the Flightomatic (Borg-Warner) instead of the Ultramatic transmission.

The low silhouette Hawks measure slightly less than five feet high, are 17 ft long and almost 6 ft wide. Rear fins on both models have been enlarged and canted outward. New rear fenders are more massive and feature integral back-up lights styled in identical fashion to tail lamps. Rear lights are mounted vertically.

Three transmission options will be available on the Hawk line. The Silver Hawk will be equipped with conventional transmission with either over-drive or Flightomatic torque converter automatic transmission optional at extra cost. Overdrive transmission will be standard on the Golden Hawk with Flightomatic optional. The Flightomatic has a five position selector shift for park, neutral, low, drive and reverse, and features "double kick-down" power available up to 60 mph. Both the overdrive and the Flightomatic transmission will be optional on all sedan and station wagon models.

All cars have a full range of optional power assists including power steering, power brakes, power windows and power seats.

All models, except Champion, will be equipped with a new Ross manual steering gear. Saginaw power steering is continued as optional equipment.

Dual exhausts will be standard on Hawk V-8 models. A padded dash is standard equipment on all President models, while a padded safety roll on the back of front seats has been made standard for all models. Directional signals are also standard equipment throughout the 1957 Studebaker car lines, as are two-speed electric windshield wipers. Among other safety features are padded sun visors. New for 1957 is a double socket safety rear view mirror which is hinged to swing out of the way when struck.

Modifications to a specially engineered rear suspension system provide the same soft ride in station wagons as available in sedan models, while also supplying a firmer support to the body when the wagon is loaded with cargo. In this system, a helper spring goes into action to assist the springing that is active under normal load conditions. Champion models now have three-leaf rear springs with a lower rate.

# GMC Light and Medium Trucks for 1957

GMC LIGHT and medium trucks for 1957 have a new 347 cu in. V-8 truck engine with a compression ratio of 7.8:1 and 206 gross hp, an increase of 26 hp over 1956 V-8's for comparable models. With the new engine, some models have one horsepower for each 15½ lb of vehicle weight.

New developments in GMC's heavy-duty trucks for 1957, which will include air suspension models, will be announced later.

Models in the GMC 100-250 light- and 300-370 medium-weight brackets range from town-and-country pickups and Suburban station wagons to Dual-Purpose cross-country highway tractors, which combine the best features of cab-over-engine and conventional vehicle designs.

Four-wheel drive that can be converted to a twowheel-drive for open highway use by the shift of a single lever is a factory-installed option in the lightduty GMC truck line.

Styling changes include a new recessed multi-bar grille angled forward at the top, and two raised ribs

At right is shown the new 347-cu-in. V-8 engine for GMC 1957 light and medium-duty trucks which develops 206 gross hp and has a compression ratio of 7.8:1. Eight models in the 100-370 series are equipped with this power plant.

1957 GMC pickup below is powered by a 347-cu-in. V-8 engine. Styling changes throughout the entire line of GMC light and medium-duty models include hood "wind splitters" and multi-bar recessed grilles.

on the hood, known as "wind splitters." Exterior features also include safety locks on cabs and panel rear doors, and a redesigned locking device on Model F350 and F370 accessibility doors.

A new deep center steering wheel on 100-250 models, with the center column and horn button wellrecessed, gives the driver greater crash protection.

Two 6-cylinder engines and a V-8 power various





# Condensed Specifications of Engines Powering Light and Medium Duty GMC Trucks

V-8 ENGINE

	A-D EMOUVE	
Displacement (cu in.)	200	347
Bore & stroke (in.)	desi	315 1a x 39 1a
Gross H.P. @ rpm	1000	206 @ 4400
Not H.P. @ rpm	-	182 @ 3600
Gross Torque (lb ft) @ r		317 @ 2000 - 2200
Net Torque (ib ft) @ rps	n —	307 @ 2000
Compression Ratio	-	7.8 to 1
6-4	CYLINDER (270	A)
Displacement (cu in.)	_	269.5
Bore & stroke (in.)		325/32 x 4
Gross H.P. @ rpm		130 @ 3800
Net H.P. @ rpm		121 @ 3400
Gross Torque (lb ft) @ r	n/n	238 @ 1200 - 2000
Net Torque (lb ft) @ rpn		233 @ 1200
Compression Ratio	-	7.75 to 1
8-4	CYLINDER (270	8)
Displacement (cu in.)		269.5
Bore & stroke (in.)		325/32 x 4
Gross H.P. @ rpm		140 @ 3600
Net H.P. @ rpm	-	127 @ 3400
Gross Troque (lb ft) @ r	om -	246 @ 1400 - 2000
Net Torque (lb ft) @ rpm		241 @ 1400
Compression Ratio		7.75 to 1

models. Both 6-cylinders have 270 cu in displacement, but because of different carburetion, one develops 130 and the other 140 hp.

Redesigned and strengthened transmissions, propeller shafts, bearings, and rear axles have been incorporated throughout the entire line. The five-speed transmission is optional in models 350-370. A three-speed synchromesh transmission teamed with the new V-8 engine is provided in 100 and 150 models.

GMC Hydra-Matic transmissions are optional equipment on all models. A new Hydra-Matic, available on several models, has low shift points which permit smoother shifts through all gears, thus assuring operation in fourth direct, even in congested areas. Other features of the new models include new shock absorber mountings, new engine supports on some models, an air-pack brake option on medium-duty units, cast or disk wheels in 370 series models, new power take-off gear box option for model 300's, tractor brake protective devices for 370 models, and negative ground electrical systems for all vehicles.

Dual stop and tail lights are now standard on panel and Suburban 100 and 250 models, and larger 60 ampere-hour batteries are used in all V-8 models.

Other refinements include the heavy-duty T-3 headlamps on all 300-370 models, and, on V-8 engines, a new inverted design distributor that permits the setting of points with the engine running.

# Maintenance Problems Discussed at SAE Transportation Meeting

By Thomas Mac New

OMMERCIAL vehicle electrical system, brakes, and design for maintenance were under sharp criticism by engineers and fleet maintenance personnel alike at the National Transportation Meeting. Sponsored by the SAE, the conference, held in New York City last month, was alive with discussion on these and other subjects vital to the service of trucks and buses.

During the symposium on the trends of heavy duty electrical systems, G. W. Hostetler of International Harvester Co., proposed that electrical components of commercial motor vehicles, other than wearing parts such as spark plugs and breaker points, be designed for 100,000 miles of service. H. L. Hartzell, Delco-Remy Div., GMC, stated that only seven per cent of the electrical components used on the trucks produced in 1955 were of the heavy-duty type. The remaining 93 per cent of the trucks used passenger car type of electrical units which are not designed for long life in heavy duty service. J. V. Poticny, Leece-Neville Co., told the conference that new developments in series parallel switches have now eliminated the complicated and troublesome factors. New one unit systems are available which maintain the benefits of the basic switch and provide better service.

According to F. W. Petring, U. S. Bureau of Public

Roads, brakes are generally adequate on the vast majority of vehicles. His report was based on data gathered by the Bureau since 1941. One thing Mr. Petring said to be on the lookout for, however, is the tendency for modern brakes to cause the vehicle to swerve. He also pointed out that there is a wide range in the stopping of ability of vehicles such as trucks requiring more stopping distance than passenger cars at similar speeds.

Along with reviewing various air suspension systems for buses, A. B. Hirtreiter, Goodyear Tire and Rubber Co., predicted power suspension when gas turbine or free piston engines are used for buses. Extracts from Mr. Hirtreiter's paper are published with this article.

Fleet operators criticized the present design of some commercial vehicles. A. W. Neumann, The Willett Co., said that streamlining often is developed at the sacrifice of utility. He recommended practical design to accommodate adjustments, repairs and replacements, explaining that maintenance costs soar when it is necessary to remove the dash to service the windshield wiper motor or to take out the floor boards to reach the spark plugs. G. E. Heiber, Boston, Worcester and New York Street Railway Co., wanted to know why the manufacturers don't make a sealed brake assem-

# SAE—continued

bly. He stated that the most important single unit on a bus is left open to the weather, condensation from exhaust fumes, and all types of foreign matter swirling up from the roadbed. Mr. Heiber pointed out that the Model T Ford had a sealed brake submerged in oil.

Following are abstracts of two of the papers presented at the meeting.

# A Resume of Bus Suspensions

# By A. B. Hirtreiter

GOODYEAR TIRE AND RUBBER CO., INC.

In the last year there have been a great many improvements in air springs for commercial vehicles as

well as passenger cars. In the bellows type, the Goodyear Tire & Rubber Co. developed an air seal or selfsealing type of air spring. This air spring is installed on two tapered end plugs without the use of any bolts,

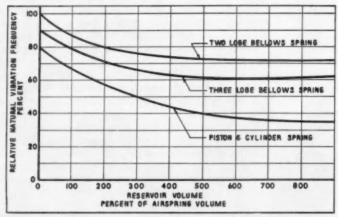
BELLOWS TYPE

UNRESTRICTED DIAPHRAGM

ROLLING LOBE

RESTRICTED DIAPHRAGM

Types of air springs



Natural vibration frequency relationship between similar suspension systems using an ideal air cylinder with a frictionless piston, a three lobe bellows and a two lobe bellows air spring with given load and spring volume.

nuts, clamps or other retainers. The sealing principle is the same as that used on tubeless tires and has been very satisfactory. With this arrangement a leak-proof seal is automatic and requires no adjusting or tighten-The Goodyear air spring is built with integral bead and girdle rings and is a complete unit in itself. A small safety lip similar to that used on passenger car tubeless tires may be incorporated in the end plugs to help resist the bellows coming off of their seats at excessive extensions. With this type of air spring maintenance is greatly simplified. For the removal of axles the air springs can be removed from the complete bus in a matter of minutes and they can be installed just as quickly. For removal the air is exhausted from the system and a tire iron is used to pry the bellows off of their seats. For installation the bellows are put in place against the seats and the air turned on and they seal automatically. Bellows or air springs of this type require an expansion volume equal to two or three times the bellows volume for relatively low frequency operation.

Other new developments in air springs are types which require very little or no expansion volume and these are rolling sleeve or rolling lobe type air springs. The characteristics of this type of spring are determined by the volume of the air in the spring. the shape of the piston, degree of outside support and the volume of the expansion tank. To get very low frequencies with this type of spring, decreasing piston section from top to bottom is used which results in a decreasing effective area as compared to an increasing effective area which is common to all bellows type air springs. One of the advantages of the rolling lobe or sleeve type air spring is the attainment of a virtually frictionless seal.

The characteristics of air springs can be changed by using a lever ratio arrangement. As the ratio between the axle and the point of spring application increases, the natural fre-

(Turn to page 110, please)



Starfire 98 Holiday sedan

# **Completely Redesigned Oldsmobiles**

HEN the 1957 Oldsmobile line makes its appearance it will represent the summation of more major changes than the company has had in a new model in 20 years. From the standpoint of eye appeal it features entirely new bodies and sheet metal, new bumpers and front grille. Mounted on wide base rim 14-in. wheels, the cars are 2.3-in. lower than last year. The lower silhouette has been gained without sacrifice in interior headroom or ground clearance, and it has been achieved without resorting to a dished floor or a large tunnel. As a matter of fact, some of the mechanical changes to be described have aided in the development of a smaller tunnel in the rear compartment.

Starting with the engine, it is of interest that displacement has been upped to 371 cu in. by increasing bore to 4-in. and stroke to 3 11/16 in. This steps up horsepower to 277 at 4400 rpm; and torque to 400 lb ft at 2800 rpm.

In addition to increased displacement, numerous

other changes will be noted. Intake and exhaust ports are larger in area to improve breathing and scavenging. Outrigger brackets now support the ends of rocker arm shafts, reducing deflections and noise, and improving the durability of the valve train. Valve life is improved and valve noise reduced by in-line reaming of valve guides after assembly in the head. In addition, valve guides have a threaded groove to feed oil to the valve stem.

Exhaust valves now are of MS-201 alloy which has greater hot strength than the XCR used formerly. Exhaust valve head contour has been revised for greater flexibility and conformity.

Crankshaft main journal diameter has been increased from 2½ to 2¾ in. The hydramatic flex plate too has been redesigned to improve alignment, flexibility, and durability. Aluminum alloy bearings now are specified for the No. 1, 2, 3, and 4 main bearings as well as for connecting rod bearings. The No. 5

(Turn to page 128, please)

Super 88 Holiday coupe



The seven-ton Tatra 137 features independent torsion bar suspension on all wheels.



Push-buttons in the four-passenger cab of the Tatra 137 SI dump truck operate the hydraulic hoist, front and rear differential locks, and the auxiliary two-speed gearbox through electro-pneumatic relays.



The Praga V3S dump truck with five-ton payload rating. Engine is a 98 hp water-cooled Diesel of 452 c In. displacement.

# **Latest Czech Designs**

At the Brno Engineering Exhibition, which ended on October 7, Czechoslovakia staged what it claimed to be the largest national machinery exhibition of its kind in the world. Intended to promote exports, particularly to markets outside the Communist bloc, the display reflected the swift growth of heavy industry in the country in recent years. Machine tools and vehicles were exhibited most prominently, and among the latter were several new trucks and engines scheduled for early production.

Tatra is preparing to replace its 10-ton Model 111 with an entirely new range of trucks. One of these, seen at Brno, is the Tatra 137, a four-wheel, seventon vehicle with all-independent suspension featuring torsion bar springing. The traditional tubular backbone construction is retained, but with detail improvements to save weight. This design is notable for the complete absence of universal joints in the transmission system except at the steering knuckles when there is front-wheel drive.

The engine is a 716 cu in. V-8 aircooled Diesel rated at 180 hp at 2000 rpm. An unusual aspect is the fluid coupler which automatically disengages the blower during warm-up. This unit, consisting of two vaned elements about five inches in diameter, is placed between the two banks of cylinders. Its casing is empty of oil when the engine is cold, so that although the driving element is permanently coupled to the crankshaft, no torque is transmitted to the fan.

As the temperature reaches 140 deg F, a thermostat-controlled valve opens to permit oil from the pressure lubricating system to enter the coupler, causing the driven element to rotate and spin the blower. Excess oil in the coupler drains through small holes back to the crankcase, so that no special hydraulic reserve is needed.

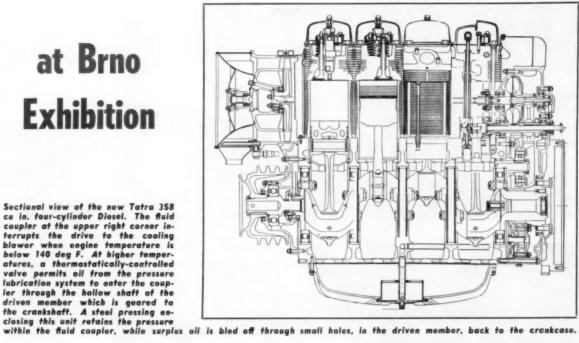
This engine is one of a new family of 1, 4, 6, 8 and 12-cylinder Diesels sharing a large number of common parts. All have 4.8-in. bore, 5.2-in. stroke, 16.5 to 1 compression ratio, and direct injection with semi-toroidal combustion chambers recessed in the piston heads.

The five-speed constant-mesh gearbox on the Tatra 137 includes a two-speed epicyclic transfer case, giving a total of 10 forward and two reverse ratios. Controls are simplified by a cluster of push buttons on the dashboard. Through electro-pneumatic relays these operate the auxiliary gearbox, front and rear differential locks, and the dump-body hoist when fitted.

The 90-in. wide cab provides ample room for four abreast, and the fully-adjustable driver's seat is on a

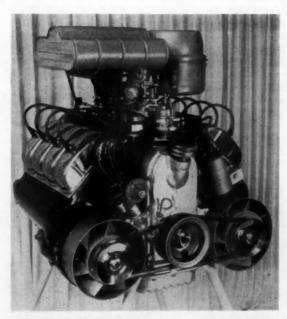
# at Brno Exhibit

Sectional view of the new Tatra 358 cu in. tour-cylinder Diesel. The fluid coupler at the upper right corner in-terrupts the drive to the cooling blower when engine temperature is below 140 deg F. At higher temperatures, a thermostatically-controlled valve permits oil from the pressure lubrication system to enter the coup-ier through the hollow shaft of the



separate pedestal. Refinements include pendant pedals, sliding roof panel, and a plastic fuel tank with a transparent window for accurate content gauging. Wheelbase of this model is 182 in., and overall length

A short wheelbase (149 in.) version of the Tatra



This 155 cu in. V-8 gasoline engine powers both the Tatra 805 military-type 21/a-ton truck and the T603 passenger car. In the latter installation it is rear-mounted, and with twin carburetors develops 100 hp at 4800 rpm.

137 is produced as a tractor and a heavy-duty dumper. In this case the longitudinal torsion bars at the rear are "folded" to give the same springing in half the effective space. Two standard bars are placed parallel ahead of each half-axle and coupled at their outer ends, instead of joined end-on as at the rear of the longer chassis.

A supercharged edition of the V-8 Diesel, developing 220 hp at 2000 rpm, is used to power the larger 12-ton Tatra 138. Here a duplicate fluid coupler is inserted in the compressor drive, with its oil content regulated by the governor to reduce its revs at engine speeds above 1300 rpm. Thus maximum engine torque is obtained at low speeds without unnecessary power consumption by this blower at the top end of the scale. The resultant fuel saving is stated to be about one gallon in 125 miles.

Construction of this six-by-six truck with all-independent suspension is similar to the Tatra 137, except that the half-axles at the rear employ leaf springs instead of torsion bars. Maximum wheelbase is 210 in., overall length 330 in., and width 88 in.

The Tatra 805 is a four-wheel-drive 21/4-ton vehicle, again with torsion bar suspension on the swing axles. Reduction gears in each wheel raise the ground clearance to 16 in. While this cross-country model was originally built for the Czech army, it was exhibited at Brno as an all-purpose vehicle. Of cab-over-engine design, it has a 155 cu in., aircooled V-8 rated at 75 hp at 4200 rpm.

Also of military origin is the Praga V3S three-axle truck with a more conventional frame chassis and leaf springing. Its engine is a six-cylinder in-line aircooled Diesel of 452 cu in. developing 98 hp at 2100 rpm. While several examples were exhibited in different body forms, there was also a two-axle five-ton



The plastic body of the Karosa - Skoda 440 sports car weighs only 145 lb. When in production, this model will be powered by the standard 64 cu in. engine tuned to deliver 60 hp.



Convertible version of the Skoda 440 features a large wrap-around windshield. The basic two-door hardtop is in the background.

version with U. S.-style front-end treatment obviously aimed at western export markets.

Another improved truck, the Skoda 706 RT with nine-ton payload rating, features a large four-place cab over the engine. Seats are placed in two rows on either side of the power unit, which is a six-cylinder water-cooled 718 cu in. Diesel rated at 170 hp at 1850 rpm.

A similar chassis forms the basis of a new luxury bus produced by the Karosa coach-building factory. Designed for long-distance touring, the Skoda 706 RTO seats 34 passengers. Special appointments include a pneumatic lift for the spare tire carried in the tail compartment to ease removal of the 300-lb wheel.

While no entirely new cars were exhibited at Brno, there were several recent developments that indicate the current trends in Czechoslovakia. The Skoda 440 was shown in convertible form which includes a fully-recessed top and large wrap-around windshield. Aside from the cranked door frames and new grille, the lower portion of the body is essentially the same as the two-door hardtop, and the established central tubular chassis with independent rear suspension is used.

Output of the 64 cu in. ohv engine is increased to 50 hp at 5000 rpm by employing a new two-barrel carburetor and by raising compression ratio to 8 to 1. As with existing production engines, weight is greatly reduced by using aluminum alloy for all major castings except the wet cylinder liners, crankshaft and camshaft.

Karosa displayed a sports version of the Skoda 440 featuring a body of laminated glass-fiber reinforced plastic. The plastic shell with integral floor weighs only 145 lb, and the weight of the entire car is about 145 lb less than the steel-bodied one. Although this model is still undergoing tests, it is expected that in final form the engine power will be raised to 60 hp.

The Skoda 1201 revealed a number of mechanical and styling improvements over its predecessor, the 1200. Power of the 74.5 cu in. engine is boosted from 36 to 45 hp at the same 4000 rpm by a new Jikov carburetor of Czech origin (replacing the Solex units previously made under French license), improved breathing, modified combustion chambers giving 7 to 1 compression ratio, and strengthened valve springs. Other changes are in the clutch, gearbox and rear axle. This model will be available for export next year.

# Divisional Building Program Is Launched By General Tire

Completion of a 45,000 sq ft divisional office in Philadelphia by General Tire & Rubber Co. marks the first step in a broad expansion program. Included also are the construction of new office and warehouse facilities for six of the company's divisions.

Planned under the two-year pro-

gram, which will cost \$3 1/4 million, are new buildings for divisions located in Detroit, Boston, Denver, Portland, Ore., and Charlotte, N. C. The company's Brittain warehouse near Akron, O., also will be expanded.

# New Pontiac Has Larger Engine



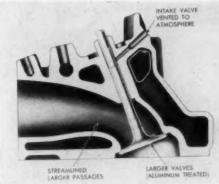
Star Chief custom four-door sedan offers a new V-8 engine and improved Strato-Flight Hydra - Matic transmission.

Pontiac's 1957 V-8 engine provides a drilled passage in the cylinder head which mates with a groove in the valve stem to prevent the vacuum within the intake passage from drawing oil between the valve stem and the stem guide.

Pontiac introduces its 1957 models in three series—the Star Chief on a 124-in. wheelbase, the Super Chief and Chieftain on 122-in. wheelbase—and in 16 new body styles. The new models feature Star Flight body styling with "starlite" or "accent" two-toning. Overall length has been increased 1.2 in.; however, the lower silhouette and the streamlined styling create a much longer and fleeter appearance.

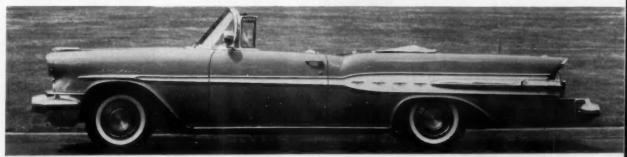
The Strato-Streak V-8 engine, with displacement increased to 347.04 cu in. (bore 3.94 in., stroke 3.56), has higher horsepower, 10:1 compression ratio, larger manifolding, completely machined and contoured combustion chambers, larger valves and newly designed carburetors. The 1957 line will offer engines with horsepowers of 252 and 270, and an additional extra horsepower engine especially designed for police cars.

Pontiac offers a "first" in high-compression engines—intake valve stems vented to atmospheric pressure to prevent oil being drawn into the combustion cham-



ber under high vacuum operating conditions. New steel-band, thermal-controlled pistons are standard. Among other features of the engine are a new distributor, more powerful starting motor, new ignition (Turn to page 124, please)

Star Chief Convertible coupe has overall length of 213.8 in. The Strato-Streak V-8 engine has a higher horsepower than 1956 models and a 10:1 compression ratio.



# New Design Features of Mercury

ERCURY for 1957 has a new, larger body with distinctive styling; greatly improved riding qualities; higher powered engines; 14-in. wheels with wide base rims; increased brake

Schwitzer power boost fan which incorporates a hydraulic coupling element

HIGH-TEMPERATURE CONDITIONS

INDICATOR

OFF ON

"OFF"

CLUTCH FACES
TOGETHER
SALTONE OIL
PHONDES, THE
MAINES SHERKES)

FAN

SPEED

10

1000
2000
3000
4000
FAN

SPEED

10

TODO
2400
3600
7200
PINAP RPM

STUDIES OF FAN REQUISES SHENTS REVEAL THAT A FAN SPEED ABOVE 2600 RPM IS MOT NEEDED

Operation of the Schwitzer power boost fan

area incident to increased lining width; and keyboard (pushbutton) automatic transmission control.

Styling has been aimed at a lower center of gravity with overall height reduced by 2 5/16 in. This has been accomplished by use of a lower, wider body shell, 14-in. wheels, a new and wider chassis frame, and a new rear axle in which the drive pinion center has been offset 34-in. lower to provide additional clearance with the underbody.

Wheelbase has been upped to 122 in.; overall length increased to 211 in. Displacement remains the same on the standard equipment engine, although increased performance is promised by an increase in compression ratio to 9.75 to 1, and an increase in intake valve diameter and intake port size. In addition, Mercury will offer a 368 cu in. displacement engine as optional in all cars specified with Merc-O-Matic drive.

Riding quality has been vastly improved, producing a smoother and better controlled action under all driving conditions. Special provisions for improved ride have been incorporated in Montclair and Monterey sedans and phaetons as well as in station wagons when such cars are equipped with the 268 engine. In these cars, Mercury has introduced the first air-rubber insulators for rear springs. Insulation is accomplished by anchoring the front end of rear leaf springs in a unique air cushion assembly, which contains two tireshaped insulators inflated with air at atmospheric pressure. Driving and braking forces, together with all other variable forces, are thus cushioned and insulated from the frame and body. Added to this are large auxiliary rubber bumpers mounted to the frame over the rear springs. Their function is to induce variable rate in the springs, thus increasing spring resistance as the load increases.

The front suspension, too, has been greatly changed in detail. In the first place, the lower support arm pivot has been swept back to give the effect of a trailing arm suspension. In addition, front suspension pivot arm bushings are larger and have greater capacity for absorbing shock and deflections. Moreover, the front suspension now has a longer coil spring to effect a lower rate.

Another feature of the suspension is the adoption of improved direct acting shock absorbers. A special restricted orifice for both strokes has no action in ordinary boulevard driving but complements the normal orifice and blow-off valve control for damping extreme suspension movements.

The entirely new chassis frame is 12.5 in. longer and 14.5 in. wider, of ladder-like design, with box-section side rails and five cross members. It has a kick-out ahead of the rear end kick-up to permit use of a depressed rear floor pan.



Service brakes are of single anchor, duo-servo type with 11-in. drums. Rear wheel braking duty has been increased to 41 per cent, in keeping with the altered weight distribution and lower center of gravity. Brake lining width has been upped to 2.50 in. front and rear, standard; and 3-in. on the front wheels when the 368 cu in. engine is specified, or for station wagons.

The rear axle has been changed to accommodate a new differential carrier. Here the drive pinion has been offset an additional \(^34\)-in., making for the largest offset employed to date. This was done to increase the clearance between the drive line and floor pan. The drive pinion is of the straddle-mounted type, similar to heavy-duty axles, being carried at the forward end by opposed tapered roller bearings held in a separate retainer while the pinion pilot end is held in a bearing mounted in the carrier.

To assure proper clearance with the lowered rear floor pan, the propeller shaft has a long tubular swaged section at the rear axle end.

The 312-cu in. engine is standard on all Mercury models; while a 368-cu in. engine is available as optional equipment on special order. An increase of approximately 10 per cent in horsepower is obtained in the 312 cu in. engine by increasing the size of intake manifold passages and the diameter of the intake valves and ports, introducing a high output camshaft, and increasing compression ratio to 9.75 to 1.

These engines incorporate a new, low-silhouette, four-barrel carburetor.

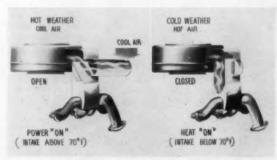
Another addition is a hot-and-cold carburetor air duct with thermostatic control. By means of a damper, cool air is taken in from the outside, or hot air is taken in from inside the exhaust manifold area, depending upon engine requirements. The duct is said to assure fast engine warm-up, elimination of icing, and increased power output.

# MERCURY ENGINES Condensed Mechanical Specifications (Overhead Valve V-8)

Designation	312	368
Bore (in.)	3.80	4.0
Stroke (in.)	3.44	3.66
Displacement (cu in.)	312	368
Compression ratio	9.75 to 1	9.75 to 1
Bhp (max.)	255 @ 4600 rpm	290 @ 4800 rpm
Torque (lb ft) Max	340 @ 2600 rpm	405 @ 2800 rpm

A new type of air cleaner silencer with a disposable paper filter element has large surface area to provide for maximum protection. The element can be cleaned by tapping and shaking.

Other innovations are a centrifugal type ignition distributor with vacuum control designed for maximum economy and a high-speed generator with ample charging capacity at low speeds, which is driven by redesigned belts. (*Turn to page 120, please*)



Hot and cold intake air system



Royal four-door sedan

# Longer, Lower Dodges With New Styling

Dodge for 1957 will be lower, longer and wider with hardtop models that are less than 55 in. high. Outstanding styling features are "sweptwing" rear fenders and a new roof design that permits the use of as much as 53 per cent more glass. Windshields are larger than ever, wrapping around at the bottom as well as the top. On the convertible, the windshield also curves into the roof itself. To the rear, a full-width back window wraps entirely around to slender, sloping corner posts, affording the driver a good view of both rear fenders.

The front suspension system employs torsion bars in place of coil springs, and rear leaf springs are mounted outside the frame for increased stability.

Compression ratio of the six-cylinder engine, available in Dodge Coronet models, has been raised to 8.0 to 1. Horsepower is 138 at 4000 rpm.

Displacement of the Dodge Red Ram V-8 engine has been increased from 315 to 325 cu in. and the compression ratio raised to 8.5 to 1. Horsepower is 245 at 4400 rpm. The Red Ram V-8 is standard equipment in Coronet V-8 and Royal models.

The Super Red Ram V-8 engine for Custom Royal models is equipped with a four-barrel carburetor, dual exhausts and extensions, special distributor, special air cleaner and a four-barrel intake mani-

# De Soto for 1957

DE Soto will have two engines for 1957, the larger of which will be available in two versions. The engines are: Fireflite Model S26 with a bore and stroke of 3.78 by 3.80 in. and displacement of 341 cu in. Its compression ratio is 9.25 to 1, and with a four barrel carburetor it develops 295 hp at 4600 rpm. Firedome Model S25 is the same engine except that it is equipped with a two barrel carburetor and develops 270 hp at 4600 rpm. The Firesweep Model S27 engine has a bore and stroke of 3.69 by 3.80 in., compression ratio of 8.5 to 1, and displacement of 325 cu in. With two barrel carburetor, horsepower

is 245 at 4400 rpm; with optional four barrel carburetor the output is 260 hp at the same speed.

The Fireflite series of cars will be offered in fourdoor sedan, Sportsman coupe (hard top), Sportsman sedan (hard top), convertible coupe, Explorer station wagon (three seat), and Shopper station wagon (two seat).

Body styles in the Firedome series will be a fourdoor sedan, Sportsman coupe, Sportsman sedan, and convertible coupe.

The Firesweep series will consist of a four-door sedan, Sportsman coupe, Sportsman sedan, Explorer station wagon, and Shopper station wagon.

Wheels are 14 in. in diameter on all models with six-inch rims on Firedome and Fireflite; 5½ in. rims on Firesweep.

Principal new features of the cars were described in AI Oct. 1, starting on page 48.



Coronet Club Sedan, lowest priced model in the 1957 line

fold. Horsepower is rated at 260 at 4400 rpm.
A special, high-performance D-500 engine, avail-

able with double rocker arms and dual exhausts and extensions, has a single four-barrel carburetor. Horsepower is 285 at 4800 rpm. The D-500 engine with two four-barrel carburetors develops 310 hp at 4800 rpm.

Fourteen-inch tubeless tires are standard on the new cars. The larger tires, mounted on a smaller but

wider rim, offer a double tread to the road surface. New, floating shoe, total-contact brakes are said to require one-quarter less pedal effort for operation.

The 1957 Dodge line consists of four separate series—Coronet, Royal V-8, Custom Royal V-8, and Station Wagon V-8. There are four different four-door sedans, three four-door Lancer hardtops, two club sedans, two convertibles and five station wagons.

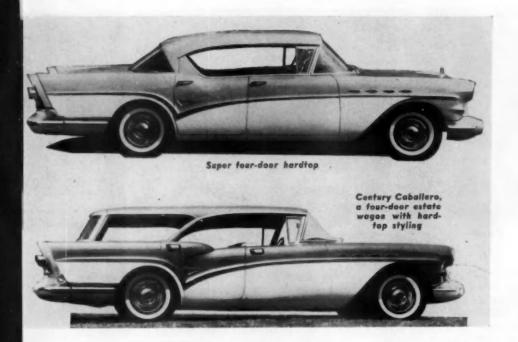
### 1957 DODGE ENGINE SPECIFICATIONS

Getaway Six	Red Ram V-8	Super Red Ram V-8	D-500	D-500
230 cu in.	325 cu in.	325 cu in.	325 cu in.	325 cu in.
3.25 x 4.63	3.69 x 3.80	3.69 x 3.80	3.69,x 3.80	3.69 x 3.80
8.0 to 1	8.5 to 1	8.5 to 1	9.25 to 1	9.25 to 1
138@4000 rpm	245@4400 rpm	260@4400 rpm	285@4800 rpm	310@4800 rpm
208@1600 rpm	320@2400 rpm	335@2800 rpm	345@2800 rpm	350@3200 rpm
	230 cu in. 3.25 x 4.63 8.0 to 1 138@4000 rpm	230 cu in. 325 cu in. 3.25 x 4.63 3.69 x 3.80 8.0 to 1 8.5 to 1 138@4000 rpm 245@4400 rpm	Getaway Six         Red Ram V-8         Red Ram V-8           230 cu in.         325 cu in.         325 cu in.           3.25 x 4.63         3.69 x 3.80         3.69 x 3.80           8.0 to 1         8.5 to 1         8.5 to 1           138@4000 rpm         245@4400 rpm         260@4400 rpm	Getaway Six         Red Ram V-8         Red Ram V-8         D-500           230 cu in.         325 cu in.         325 cu in.         325 cu in.           3.25 x 4.63         3.69 x 3.80         3.69 x 3.80         3.69,x 3.80           8.0 to 1         8.5 to 1         9.25 to 1           138@4000 rpm         245@4400 rpm         260@4400 rpm         285@4800 rpm

De Soto Firedome four-door sedan



AUTOMOTIVE INDUSTRIES, November 1, 1956



# for 1957

1957 Buick cars will have still better performance, stemming from a redesign of major engine elements which increases displacement to 364 cu in. with a corresponding increase in horsepower and torque. Eye appeal, too, has been enhanced by the introduction of new front and rear end treatment; a significant decrease in overall height of bodies; and a still larger wraparound windshield.

Lowering of roof lines, general body lines, and floor has been accomplished by widening the chassis frame to cradle the dished floor pan, by lowering the passenger seats, and by changes in the drive line to provide adequate clearance for the lowered floor.

Besides the major changes in engine components and engine accessories, Buick has introduced some significant improvements throughout the entire running gear. Among the most noteworthy is the adoption of ball joint suspension at the front.

Major line-up of models for 1957 is as follows—Series 40: six-pass. 4-door sedan with four windows; 4-door hardtop; 2-door convertible; 2-door hardtop; 2-door sedan; 4-door station wagon. Series 60: 4-door hardtop; 2-door convertible; 2-door hardtop; 4-door station wagon. Series 50 and 70: 4-door hardtop; 2-door convertible; 2-door hardtop.

The basic engine used on all models now has a displacement of 364 cu in., compared with 322 cu in. in 1956. On Series 50, 60, and 70 cars, the engine is fitted with a four-barrel carburetor and has a compression ratio of 10 to 1, lifting horsepower to 300. On Series 40 cars, the engine has a two-barrel carburetor, compression ratio of 8 to 1 with synchromesh transmission and 9.5 to 1 with Dynaflow. Displacement was increased by two moves: bore diameter was increased to  $4\frac{1}{8}$  in., while the stroke was changed from 3.2 to 3.4 in.

The crankshaft is new, incorporating an increase in throw of 0.1 in. Rib thickness of the cheeks has been increased. Since the overall length of the shaft remains the same, it was necessary to reduce the length of crankpins and main journals correspondingly.

Cylinder heads were suitably modified in keeping with increased bores. Breathing has been improved materially by increasing carburetor venturi area, intake manifold area, exhaust valve area, and intake valve area. In addition, the camshaft has been changed to provide for increased valve lift and period of valve opening. Exhaust ports now are of rectangular shape.

Connecting rod bearings are Moraine M400, steel-backed aluminum alloy. Similarly, the front four main bearings of the same type. The rear bearing, however, is of Durex 100A.

The engine for Series 40 with Dynaflow is rated 250 bhp at 4400 rpm, with torque of 380 lb ft at 2400 rpm. The engine for Series 50-60-70 has a top rating of 300 bhp at 4600 rpm, torque of 400 lb ft at 3200 rpm. Premium fuel is required with Dynaflow-equipped cars.

Tendency to vapor lock has been materially reduced by use of an inverted type fuel pump, mounted lower, in a cooler location.

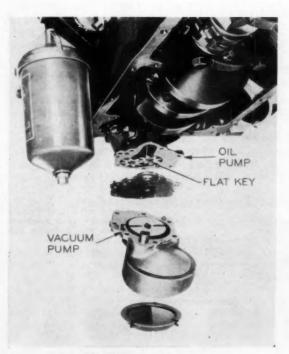
One of the new accessory items is a combination oil and vacuum pump. Net capacity has been increased by nearly one gallon per minute. In addition, the pump now is fitted with a ball type relief valve.

The integrally-mounted vacuum pump is attached directly to the underside of the oil pump. It is of rotary type with the rotor driven from the oil pump idler gear by means of a hex-shaped coupling. It is said to double the static vacuum and air pumping capacity of the diaphragm pump used last year.

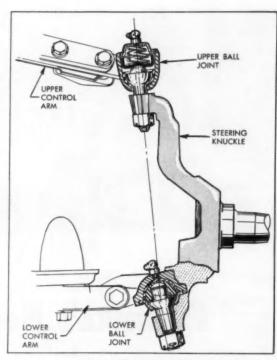
Nodal point powerplant mounting, a three point system, is used on all series for 1957. The redesigned front mounts are installed at an angle to the crankshaft axis this angle so chosen that a line perpendicular to the surface of the mounts will pass through the principal rotational axis of the entire powerplant. This was done to utilize the low shear rate of the synthetic rubber compound used by Buick, producing a lower powerplant torsional rate and increasing lateral engine stability.

The 12-volt electrical system has been improved in many directions. First of all, the starting motor has been redesigned to increase cranking speed at lower temperatures. In addition, it is better sealed, the shift yoke being fully enclosed. Servicing of the distributor has been simplified by incorporating a window in the side of the cap, making it possible to adjust the contact points without removing the cap and rotor. The centrifugal advance mechanism is located above the circuit breaker plate and cam and is mounted directly below the rotor.

The Twin-Turbine Dynaflow is standard for Series 50-60-70; optional on Series 40. It features a number of changes due to the general lowering of all chassis elements as well as the increase in engine output. To reduce height there is a shallower oilpan, new valve body and servo body, and a smaller diameter starter ring gear. To increase torque capacity, another set of clutch plates has been added, making a total of six sets. The stator control valve has been revised so that high stator blade angle is obtained in "drive"



New combination oil and vacuum pump



New ball joint suspension

range only when the accelerator pedal is fully depressed. The converter pump is fabricated of steel to facilitate the fastening of balance weights, and will be filled with oil during balancing to effect better balance.

The two types of exhaust systems will be available: single exhaust, standard on 40-50-60; dual exhaust, standard on Series 70, optional on the others. Both will utilize the ball-joint connectors used last year.

Manual steering is standard on Series 40 and 60 with a ratio of 23.6 to 1. Instead of the former trunnion mounting, the assembly is lowered in the frame and mounted in the same manner as the power steering gear, resulting in a weight saving of eight pounds. Ball thrust bearings on the worm shaft replace the bearing used heretofore. A fabric type disc coupling, the same as for power steering, is located on the steering shaft to absorb minor misalignment. Incident to these changes the upper steering shaft assembly now is interchangeable for both manual and power steering.

Coming to other chassis elements, it is of interest that an entirely new frame with redesigned cross members and side rails is used to take care of the lowering of the floor pan and to accommodate the new front suspension and engine mounting.

The front suspension has two distinctive features—ball joint pivots and anti-dive geometry. The upper ball joint consists of a spring-loaded ball stud in a forged housing with the ball seated on a layer of phenolic material bonded to the forging. The lower ball joint is of compression type with the ball stud held in the phenolic seat in a formed housing by virtue

(Turn to page 133, please)



1957 Belvedere Sport coupe with Sportone trim

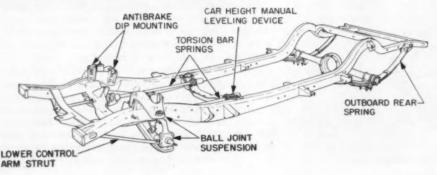
# Plymouth's New Cars for 1957



THE 1957 Plymouth will be lower and more powerful, with completely changed styling, body structure and chassis. New models are as much as five inches lower than corresponding 1956 models. The wheelbase has been lengthened from 115 in. for all models in 1956 to 118 in. for standard models and 122 in. for Suburban station wagons in the 1957 line.

Although the new car looks longer, it actually is two-tenths of an inch shorter. A broad hood, high tail fins and forward thrusting headlight brow all contribute to the impression of length.

In chassis design, Plymouth has accomplished its most significant change since the introduction of independent front wheel suspensions with coil springs in 1934. In the overall re-design of the front suspension, coil springs have been replaced by torsion bar springs. Ball joints are combined with the torsion bar springs to create a unique combination of ride and handling characteristics. A new rear suspension incorporates relocated leaf springs.



Above, left — Left front suspension which combines torsion bar springing and ball joints

Frame and suspension assembly



The parking-turn signal light is positioned parallel to the headlamp to give a dual headlamp effect

Available on all models is a 235 hp Fury "301" engine, with Power Pak. The standard V-8 engine in all Belvedere, Savoy and Suburban models is the Fury "301" engine, without Power Pak, rated at 215 hp. The comparable figures for 1956 models were 200 and 187.

Standard V-8 horsepower on Plaza models is 197. All models except the convertible are available with 132 hp six cylinder engines. This compares with 125 hp for 1956 six-cylinder cars.

Other innovations in the 1957 line include: New 14-in. wheels and low pressure, large section tires;

new 11-in. brakes, of Chrysler Corporation's Center-Plane design; and an integral all-weather air-conditioning system which combines heating, cooling, dehumidifying and ventilating in one underhood unit. This system is available on all V-8 models. A padded instrument panel and sun visors are available as optional equipment.

The windshields have 45 per cent greater glass area in sedans and Suburbans and 43 per cent greater in hardtons.

A new line of Suburban station wagons features a rearward facing third seat in nine-passenger models, roll-down tail gate window, wrap-around quarter window, torsion bar tail gate hinge, optional inside concealed luggage compartment with lock on all six-passenger Suburbans and a fuel tank mounted in left rear fender.

Plymouth for 1957 again offers three lines of standard automobiles. Belvedere is the top line. Savoy the middle and Plaza the lowest-priced. A two-door hardtop is available in the Savoy line and both a two-door and four-door hardtop are available in the Belvedere line.

Suburbans again in 1957 make up a separate line of cars, in three groups—Deluxe, Custom and Sport—and in six models, taking into account two-door and four-door models and six-passenger and nine-passenger models. All are available with either a V-8 or six engine.

# CONDENSED SPECIFICATIONS OF 1957 PLYMOUTH ENGINES

	Bore	Stroke	Displacement	Comp. Ratio	Maximum Horsepower @ RPM	Maximum Torque @ RPM
1-Fury "301" Quad (Power Pak)	3.91 in.	3.13 in.	301 cu in.	8.5 to 1	235 at 4400	305 at 2800
2—Fury "301"	3.91 in.	3.13 in.	301 cu in.	8.5 to 1	215 at 4400	285 at 2800
3—Hy-Fire V-8	3.75 in.	3.13 in.	277 cu in.	8.0 to 1	197 at 4400	270 at 2400
4—Powerflow "6"	3.25 in.	4.63 in.	230 cu in.	8.0 to 1	132 at 3600	205 at 1600

# Molybdenum-Base Alloys Viewed as Answers to Jet Age Problem

Over 300 scientists and engineers concerned with structural materials for high-temperature applications were on hand for a two-day symposium in Detroit last month on the current status and future of molybdenum and its alloys. The technical symposium was sponsored by the Office of Naval Research.

Military interest in molybdenum alloys lies principally in their potential as construction materials for such high-temperature applications as jet engine and missile parts. Current alloys are approaching the maximum limit of performance, and the higher temperatures at which aircraft and weapons of advanced design must operate, call for better materials.

Molybdenum alloys are outstanding in their strength at high temperatures. Various coatings to protect the surface from oxidation are under development, and recent work reported at the symposium indicates that coatings to permit operation at temperatures of 1800 F to 2000 F may be near at hand.

Applications, however, are not confined to aircraft and weapons. Molybdenum is highly favored for many industrial applications because of its high strength at elevated temperatures; high melting point; excellent thermal and electrical properties; ready machinability; ease of fabrication, etc.



Country Club hardtop sedan

# Nash Ambassador Has New Headlamp System

The 1957 Nash Ambassador, lower than the 1956 model by two inches, features a V-8 engine developing 255 hp, and a new headlamp system, with two lamps mounted vertically in each fender. All four lamps are used for the high beam; only the upper two are used for the low beam. The new system is said to supply up to 100 extra feet of illumination, while at the same time concentrating the light in such a way that oncoming drivers are not "blinded." The upper lights direct more light down the right side of the road, and the two lower lamps probe down the highway.

The 1957 styling changes begin at the front with the chrome-encased headlamps set in the fenders. The new oval grille is of rectangular-mesh design. In the grille's center is a wide-spread golden "V," above which is the Nash emblem. The parking-turning lights are atop the front fenders and are visible from the side of the car.

The roof has been lowered 1¼ in, and 14-in, wheels have replaced the 15-in, wheels. Tire size has been increased to 8.00 by 14, resulting in a net reduction in height of two inches. Overall height of 1957 model is five feet.

On the sides, the front fenders have full wheel cutouts, which reduces the turning diameter from 44 ft-4 in, to 42 ft.

All 1957 Nash models are powered by the new, larger AMC V-8 engine, rated at 255 hp, as compared to a top horsepower in 1956 of 220.



All four headlamps are used for the high beam, while only the upper two are used for the low beam

It has a compression ratio of 9:1, displacement of 327 cu in. and torque rating of 345 ft-lb. The engine has a large bore and short stroke, 4 in. by  $3\frac{1}{4}$  in., plus three-ring pistons. A four-barrel carburetor is standard equipment.

Three transmissions—Hydra-Matic, overdrive, and synchromesh—are available with the V-8 powerplant. Selecto-Lift starting is used on cars with Hydra-Matic. The shift lever is lifted to activate the starter.

Four models are available in the 1957 Nash line. They are the Ambassador Custom Country Club hard-top, Ambassador Super Country Club hardtop, Ambassador Custom four-door sedan, and Ambassador Super four-door sedan.

The All-Season air conditioning system has been redesigned for 1957. The unit has a new compressor with a built-in muffler system for quieter operation. Also, a new receiver tank incorporates a built-in filter and check-valve, which eliminates tubing joints, thus reducing leakage problems.

Power brakes are standard equipment on Custom models and optional on Supers. Optional on both series are power steering and power window lifts. Wheelbase is 1211/4 in.; overall length is 2091/4 in.



The Saratoga, a new series of Chryslers in the price range between the Windsor and the New Yorker. Either single or dual headlamps are available. The model shown is a four-door sed on with aluminum-framed window openings

## New Chrysler and Imperial Models

RESENTED here are some selected illustrations of the 1957 Chrysler and Imperial cars. A description of these new models appeared in AUTOMOTIVE INDUSTRIES, October 1.

#### ENGINE RATINGS

	Hp	Torque
Chrysler Windsor	285	365 lb ft @ 2400 rpm
Chrysler Saratoga	295	390 lb ft @ 2800 rpm
Chrysler New Yorker	325	430 lb ft @ 2800 rpm
Imperial	325	430 lb ft @ 2800 rpm



Imperial convertible which features dual headlamps and four-way wraparound windshield. The 1957 Imperials are nearly four inches lower and three inches wider than 1956 models.



Imperial two-door Southampton hardtop. Molded spare tire impression in rear deck lid is optional.

Chrysler New Yorker four-door hardtop





## The Metal Show

#### By Charles A. Weinert

ATTRACTED by past performances and the fulfilled promise of a greater show than ever, the 38th National Metal Exposition and Congress, held last month in Cleveland, drew an attendance of more than 68,000 registrants. Host for the event was the American Society for Metals. Also participating in the National Metal Congress, which comprised nine programs and over 150 technical papers, were the American Welding Society; Institute of Metals Div., American Institute of Mining, Metallurgical and Petroleum Engineers; Society for Nondestructive Testing; Metals Section of Special Libraries Association; and the Industrial Heating Equipment Association.

The 1956-57 officers of the ASM, who assumed office at the annual meeting held during the show, are: President, D. S. Clark, professor of mechanical engineering, California Institute of Technology; Vice President, G. M. Young, technical director, Aluminum Co. of Canada; Treasurer (continuing term), C. H. Lorig, assistant director, Battelle Memorial Institute; and Secretary (re-elected), W. H. Eisenman. Trustees are: C. E. Swartz, Hinsdale, Ill., consulting metallurgist; G. A. Fisher, Jr., in charge St. Louis Technical Section, International Nickel Co.; H. A. Wilhelm, professor of chemistry and associate director, Ames Laboratory of Atomic Energy Commission; and G. E. Shubrooks, chief engineer, Hamilton Watch Co.

The featured speaker at the First National Awards Luncheon of the ASM was Charles M. White, Board Chairman, Republic Steel Corp., who spoke on the sub-

ject of "Trained Manpower for a Technical Age." He called for a sweeping "rebuilding of our educational system to meet the needs of a scientific age." The problem is not automation putting men out of jobs, he said, but giving enough men enough training to operate and maintain tomorrow's technology. He termed the size of the educational job ahead as "staggering," adding: "Our present school plant has been 150 years in the building. We may have to double it in 25." In addition to the awards presented at this luncheon (see AI, October 1, p. 114), five steel and metalworking firm presidents were honored with honorary life memberships in the ASM. They were: R. L. Gray, Armco Steel Corp.; J. L. Mauthe, Youngstown Sheet and Tube Co.; W. F. Munford, American Steel are Wire Div., U. S. Steel Corp.; W. E. Umstattd, Timken Roller Bearing Co. Mr. White also received an honorary life membership.

Leaders in the field of welding were honored for outstanding achievements, at the official opening of the American Welding Society's sessions. G. E. Linnert, head of welding research at Armco Steel Corp. Laboratories, presented the Adams Honor Lecture. His paper covered the timely subject, "The Welding of Precipitation Hardening Stainless Steels." This honor lectureship is awarded annually to an outstanding scientist or engineer who has made a new or distinctive development in the field of welding.

C. E. Jackson, research metallurgist, Metals Research (Turn to page 109, please)





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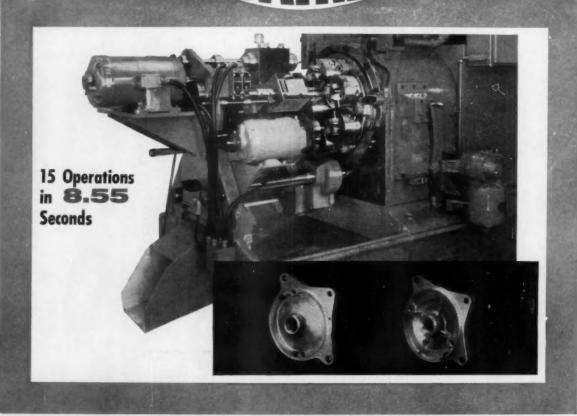
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On the job illustrated above . . . die cast aluminum starting motor end plates . . . a feature is that only the first two of the six spindles revolve, at which time both sides of the flange are faced, both locating diameters turned, the center hole rough-bored, faced and chamfered, and inside hub back-faced and chamfered. The remaining stations, #3, #4 and #5, are stopped and accurately positioned while powered tools mounted on the tool slides finish-bore the center hole, tap two  $1/4{-}20\ \text{holes}$ , and bore one .313 -.315 diameter hole off-center.

Sequence of Operations: Face both sides of .421 - .425 flange, turn and chamfer 4.087 - 4.083 and 3.868 diameters, rough and finish-bore .8115 - .8130 center hole, back-face and chamfer inside hub (recessing head), face and chamfer outer hub, tap two 1/4-20 holes, and bore one .313 - .315 diameter hole.

Production: Cycle time 8.55 seconds per piece, 421 pieces per hour gross.

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Last Longer make Valves Last Longer

For engines in heavy-duty service where high operating temperatures are experienced over extended periods of time, Eaton Valve Seat Inserts have proven their ability to materially reduce valve and insert failures, to maintain a high level of engine output—and to add extra thousands of trouble-free hours to valve life.

Eaton engineers will be glad to discuss the application of Eatonite Valve Seat Inserts with your engineering and metallurgical departments.

MAXIMUM DURABILITY

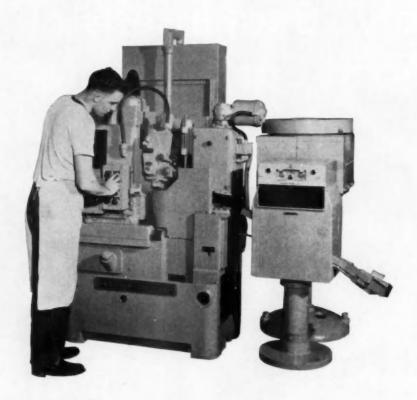
High Hot Strength
High Hot Hardness

Freedom from Corrosion, Wear, Cracking, Loosening

## EATON

MANUFACTURING COMPANY

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



### HIGH SPEED HOBBING with automatic handling, loading, gaging

BARBER-COLMAN

No.3-6

AUTOMATIC

HOBBING MACHINE

The Barber-Colman No. 3-6 Vertical Hobbing Machine is a high speed machine designed specifically for automatic loading and automatic gaging of parts which are mass-produced. The machine has standard basic elements, but the tooling, loading, gaging and handling are designed for continuous operation and maximum production of a specific part. The high-speed operation of the machine makes it adaptable to all mass-produced parts up to 3" diameter by 6" face width, with maximum pitch capacity of 10DP. Hob speeds for carbide hobbing of non-ferrous and nonmetallic blanks are available. Features which contribute to the high-speed operation of the machine include exceptionally large heat-treated and ground bed ways, short drives to the work and hob spindles, and a multiple-thread index worm.

#### here is a typical job

Gear: 18DP, 16 T., 20° P.A., O.D. 1.077"/1.074"

face width %", SAE 1330 Steel

Hob: 21/4" x 4" x 3/4" bore, single thread, pre-

shave, Class C Accurate Unground

Machine: Cycle Time - 1 minute

Feed — .050"/rev. Speed — 250 SFM 1 Per Load If you have high production requirements for speedometer and transmission gears, starter pinions, appliance gears, or other mass-produced gear forms, send us blue-prints or samples for estimates on automatic handling, loading, hobbing and gaging. Our engineers will show you how this new approach can be integrated into automatic, conveyor or transfer-type production lines to reduce time and cost per piece to a minimum.

#### High speed and reduced handling cut production time and cost

#### Automatic Loading

The machine shown here has a vibratory hopper. Blanks are automatically loaded from the hopper by a mechanically operated loading arm. All motions are held in time by keys and tapered pins so that servicing is easy. Gears are ejected and blanks loaded all with the same motion. The loader drive is separate from the machine drive, but electrically interlocked with machine operation. The type and variety of loading devices with which this machine can be equipped are almost unlimited. Loading can be by magazine or conveyor when required.

#### Automatic Gaging

The gaging mechanism measures PD and rejects those gears oversize or undersize. If a predetermined percentage of gears are cut out of tolerance, the machine stops automatically. Gaging units for checking other gear elements can also be adapted to the machine and are readily available on the market.

#### Automatic Hob Shifter

Automatic hob shifting is provided to shift the hob a certain amount after each cycle, or it can be arranged to shift after a certain number of parts have been cut. Shifting increments are changed easily by means of a graduated dial. The hob slide is clamped pneumatically.

#### Centerdistance Adjustment

The hob is set to the proper depth by means of a centerdistance adjusting mechanism. The hob is placed in a fixture, and an indicator finger is set against the outside diameter. The indicator is calibrated to read directly the centerdistance between the work and the hob. This setting is made by means of a graduated dial on the machine and eliminates the usual time-consuming method of setting depth.

#### BARBER-COLMAN COMPANY

7611 ROCK STREET . ROCKFORD, ILLINOIS

Hobs · Cutters · Reamers · Hobbing Machines · Hob Sharpening Machines



# NOW

## STERLING CONFORMATIC PISTONS



CONFORMATIC STEEL CONTROL MEMBER, anchored at the pin bosses only, controls skirt clearance...hot or cold! The metered steel insert allows you to specify the piston clearance you want for your engine. (Clearances from zero to ½ thousandth inch are generally recommended.)

are
available with
LOW COST

# Intra-Cast\*

STEEL-LINED

#### GROOVES

Steel protection—top and bottom—gives sensationally longer life to rings and grooves.

This ring is integrally cast into the piston... positioned so that when the grooves are machined, the top ring groove is lined with steel and has islands of aluminum for ring cooling. This Intra-Cast steel-protected groove resists enlargement and materially reduces top ring land wear and rounding. And, it does it at far less cost than other methods.

\* Tradename Registered

STERLING ALUMINUM PRODUCTS INC.

ST. LOUIS, MISSOURI

# News of the MACHINERY INDUSTRIES

By Thomas Mac New

Recent Advances in Automatic Metal Forming Machines Adapt them to Economical Production of Body Trim Components for Passenger Cars



Chrysler has recently purchased this high-speed radial draw forming machine, produced by Cyril Bath Co., for drip moldings.

#### Car Makers Turn to Radial-Draw Formers

High speed automatic metal forming machines are expected to raise by better than 200 per cent the production of body trim, roof sections, and other components for passenger cars. Developed by the Cyril Bath Co., two trim-forming machines are already at work in Chrysler's Eight Mile plant in Detroit. Four larger machines, designed to shape the heavy structural drip moldings for the full line of Chrysler cars, have been completed in the Bath Company's Solon plant and are ready for shipment. Four additional machines, not yet completed, will be capable of producing door pillars, quarter panel pillars, corner strainers, and trunk drain troughs. The two small trim machines already installed at Chrysler are producing trim at the rate of over 700 pieces an

The four drip molding formers, about to be shipped to Chrysler, grew out of a desire to further strengthen the roof in the new models. The designers have increased roof strength by increasing the strength of the dripmolding component and making it an

integral part of the roof structure.

In collaboration with the Chrysler engineers, the Bath Co. first formed this piece on its conventional radial draw former, which stretches the metal beyond its yield point and then wraps it about a die which is bolted to a rotary table, thus forming the piece "a line at a time." Finally, but as a part of the integrated operation, the new shape was "ironed" into the piece through the operation of the compression shoe.

This process, however, though effective, was too slow for the automobile industry. The high speed automatic drip-molding machines were therefore developed. These machines incorporate automatic loading, automatic cycling and automatic ejecting, all at very high speed. The piece to be formed is fed automatically into the machine where the ends are gripped by gripper heads attached to hydraulic stretch cylinders and are then automatically stretched under a pull of six tons. Two die elements are then rocked into each other under a pressure of four and a half tons and the piece is completely formed. It is then automatically ejected, a new piece is fed to the gripper jaws, and the cycle begins again.

## Washington Quizzes Tool Builders

The mobilizers who run the Government's fast amortization program (now nearly dormant) are following with keen interest the poll now being conducted by the machine tool industry as to whether or not fast write-offs should again be offered machinery manufacturers as an incentive to expand their production facilities.

Machine tool builders are being

If the Government were to set a new expansion goal (and offers fast write-off), would you expand your production facilities?

What kind and what type of new facilities would you erect?

As a result of expanding your facilities, how much extra tool-building capacity would be added?

The answers to these questions will be turned over to the Office of Defense Mobilization for that agency's use in determining whether or not fast write-offs should again be offered widely to get defense production facilities built.

At present, fast amortization is available on only a handful of projected defense facilities. The ODM has said it will decide in January whether or not to offer fast write-offs, and, if so, on what types of facilities fast amortization may be applied.

#### Air Force Machine Inventory

Out of a total inventory of about 92,000 machine tools and 45,000 to 50,000 production equipment items, the Air Force reports that at least 70 per cent are in active service. Based on acquisition costs, the total inventory value represents approximately \$1.3 billion of which about \$980 million is machine tools. In continuing an aggressive program to dispose of worn out and obsolescent machine tools, the Air Force anticipates an annual minimum replacement of two to five per

(Turn to page 130, please)



## PRODUCTION EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89



Michigan Tool Model 481 automatic precision spur gear checker for aircraft and similar precision gears. Checking operation is said to be six times as fast as had been possible previously.

#### Checker for Aircraft and Other Precision Gears

DESIGNED for inspecting aircraft and similar types of precision spur gears, an automatic gear checker is said to require only one-sixth the time formerly needed. The Model 481 checks for parallelism and tooth spacing and provides a permanent record on the recorder chart. It can be used to inspect gears ranging from 1/4 to 2% in. face width and from 1/4 to 14-in. diam. The recorder chart is graduated in increments of 0.0001-in.. making it possible to obtain actual readings to even closer limits. The recording pens, actuated by the movement of the top and bottom carbide checking fingers, use different colors of inks in order to make it simple for even an inexperienced inspector to get the required readings without confusion.

It takes approximately five seconds to check a tooth. For example, every tooth of a 35-tooth, one-inch face width spur gear can reportedly be checked for parallelism and tooth spacing in three minutes, including load and unload time. All the inspector has to do is load the gear and depress the start button. The rest of the cycle is fully automatic.

Gears are checked by the fingers moving in and out of contact with the teeth parallel to the axis. While the fingers are moving out of contact with the gear tooth, and returning to starting point in contact with the next tooth, the gear is automatically being indexed. Indexing is controlled by an index plate with a separate plate required for each gear having a different number of teeth. Adjustable indexing drive compensates for size of gear being checked and for different numbers of gear teeth. Both fingers are manually adjusted toward or away from center as required by the size of the particular gear being inspected. An adjustable eccentric shoe makes setting of the length of stroke (depending on face width of gear being checked) a quick opera-The gears themselves are mounted for inspection on an internal adjustable locking arbor and driven by a roll lock chuck. In normal operation, use of a spare adjustable arbor permits the inspector to mount the next gear to be inspected on the arbor while the first gear is being checked. Michigan Tool Co.

Circle 30 on postcard for more data

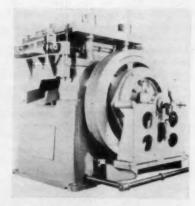
#### Flywheel Type Presses

T ARGER flywheel type presses up to 350-ton capacity for high speed production have been added to a line of metal stamping equipment. Illustrated is the flywheel side of a 350ton press capable of operating at speeds of 150 strokes per minute. Total weight of press is 102,000 lb, which is said to be more than adequate to absorb the stresses and shock of high speed stamping operations.

The machine includes "V" ways adapted to high speed stamping operations. These eight long guiding surfaces are said to assure accurate alignment of the top platen so that any cocking due to off-center loads is held to an absolute minimum. Also featured are unusually large bed areas to accommodate larger progressive dies, with the duplex models handling dies up to 20 ft in length.

This press is equipped with an airoperated dry disk type friction clutch and brake mounted on the crankshaft, capable of stopping the press at any point in the stroke within its speed range. The press is also equipped with double roll feed as standard equipment. The customer has a choice of three types of feed eccentrics, the quick feed, the standard 180-deg, or the long feed. A variable speed drive is furnished with the press to give a speed range of 50 to 150 strokes per minute. Brandes Press Co.

Circle 31 on postcard for more data



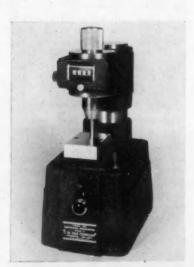
Brandes 350-ton flywheel type press

#### **Automatic Micrometer**

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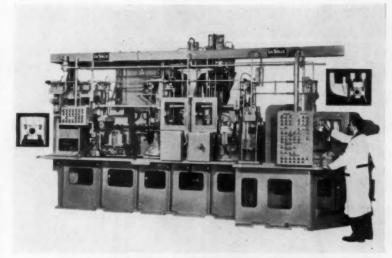
Elimination of the human sense of touch in setting the instrument is effected by an electronic circuit which responds to contact between the micrometer anvil and the work before pressure is built up on the work by the micrometer screw. Use of muscular power in positioning the work or rotating micrometer dials is replaced by a motor drive which automatically brings the micrometer to the point of contact. Mental effort is eliminated in interpreting the relative position of a zero line and a calibrated scale into a decimal dimension. The digital read-out counter on the front of the instrument displays the reading in ten-thousandths of an inch. Five divisions between each digit on the unit wheel permits readings to 20 millionths of an inch.

The Model HDR has a measuring



Model HDR Carson-Dice digital read-out

range of one inch (% in. with standard micrometer tip), and a throat depth of two inches. Upper head is adjustable in height to accommodate work up to two inches. Standard anvil is readily removed for use of spe-



LaSalle combination dial type and in-line type machine for pistons.

#### Machine for Automated Piston Production

Combining a dial type machine and an in-line type machine to form a single unit, a new automated piston line is fully automatic, with 14 stations: 5 in the dial type section and 9 in the in-line type section. It is designed to produce 400 pistons per hour; and will handle any one of three different pistons by changing the position of the selector switch and fixture locators.

In operation, the pistons as they come from the mold (as shown in the inset) are fed by conveyor directly to the machine. Sequence of operations is as follows: In the dial type section: Station 1—load piston automatically or manually; 2—mill two gates off; 3—mill two risers off; 4—transfer piston from dial type to inline type section automatically; 5—idle. In the in-line section: Station 6—load station; 7—pierce wristpin

hole and window around hole, two sides; 8—hollow mill piston OD; 9—face head of piston; 10—face and chamfer skirt; 11—gage OD of piston and compensate scale, if within limits (if oversize or undersize, a memory circuit will reject piston at station 13); 12—weigh piston and classify considering OD (if overweight or underweight, pistons are automatically rejected at station 13); 13—separate by groups of oversize or overweight pistons, undersize or underweight pistons, and accepted pistons; 14—unload good pistons.

Lubrication of the machine throughout is automatic; and a chip conveyor is provided in the base of the unit. The shuttle mechanism can be adjusted for different size and shaped pistons, allowing for model changes. LaSalle Tool, Inc.

Circle 32 on postcard for more data

cial fixtures. Repeatability is 0.00002 in.

The operating cycle is said to be several times faster than the best speed possible with manual operation. Micrometer spindle is driven up by pushing the lever switch to the rear. After work is placed on the anvil the lever switch is pushed forward and held until the measurement is completed, as indicated by lighting of a small green light under the counter. Upon release of the lever switch the micrometer spindle auto-

matically backs off to permit removal of the work. If oversize work is presented to the instrument and touches the micrometer spindle, the control system automatically drives the micrometer up until the work is cleared. An optional foot switch can be used instead of the lever switch to leave both hands entirely free for handling work.

The instrument is 11 in. high, 9 in. deep and 5½ in. wide. J. W. Dice Co.

Circle 33 on postcard for more data



## PRODUCTION EQUIPMENT

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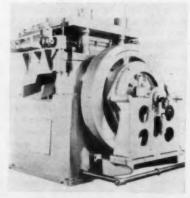
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Circle 31 on postcard for more data



Brandes 350-ton flywheel type press

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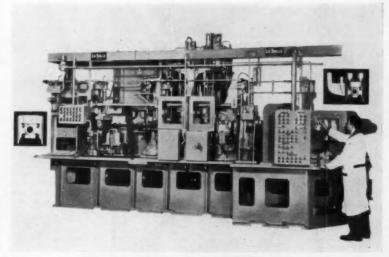
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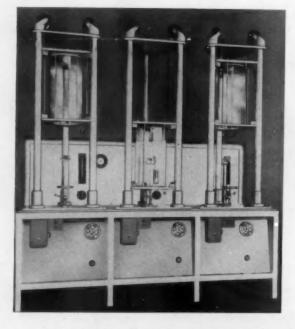
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The instrument is 11 in. high, 9 in. deep and 5½ in. wide. J. W. Dice Co.

Circle 33 on postcard for more data

## PRODUCTION EQUIPMENT



Lepel induction heating unit brazes metal assemblies without the use of flux by heating under a controlled atmosphere. The bell on the left is in loading position, and the bell on the right in heating position.

#### Induction Heating Equipment for Brazing

THE development of equipment for brazing assemblies, without the use of flux, by induction heating under a controlled atmosphere, was announced recently. The joints produced with this unit are said to be uniformly sound, as well as being naturally free of residual or entrapped flux. The process is also said to leave a smooth fillet, and to eliminate the cost of cleaning.

Combining induction heating, which provides rapid localized heating, and a controlled atmosphere, this unit joins copper alloys, steel and stainless steel assemblies on a production basis. The three work stations are operated from a single induction heating unit. High frequency current

is fed to the work coils through coaxial leads. The proper atmosphere is obtained by directing a continuous flow of purified gas into the glass or plexi-glas bell. The flow of gas is controlled by the flow meters at each of the three work stations, allowing the gas to enter through the top, spreading over a diffusion plate and escaping through the bottom The glass bells are counterweighted to move freely on the posts to facilitate the handling of the work. The heating cycle is automatically controlled at each station by pre-set timers, thus enabling one operator to work all three stations. Lepel High Frequency Laboratories, Inc.

Circle 34 on postcard for more data

#### **Air-Hydraulic Vises**

For speeding up work that requires frequent clamping and unclamping of the workpiece on bench operations, air-hydraulic vises are being offered which will open and close up to 2000 times per hour at the touch of a foot pedal air control. Maximum jaw locking force varies between 2513 and 6891 psi, depending upon the size selected. Since the locking force varies directly with the air input pressure, it can be reduced to prevent damage to soft workpieces.

The main screw and nut of the vise are engaged at all times and the jaws can be preset to any desired opening. The power stroke is adjustable up to ½-in., although recommended stroke is 1/8-in. to prevent possibility of finger injury. Wilton Tool Mfg. Co., Inc.

Circle 35 on postcard for more data

#### Control Switch

R ATED 600-v a-c or d-c, a new dust, oil and water-tight pushbutton control switch is of heavy-duty construction and is said to meet JIC and National Machine Tool Builders' Association specifications. Called the

Gold-N-Ring, it is designed for a wide range of applications, including machine tools and automated production equipment, that require dependable performance from components that go to make up control stations and panels.

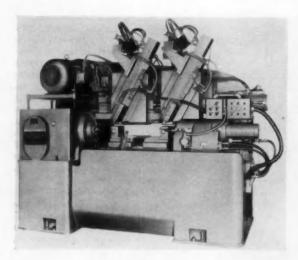
Built to mount in 1 13/64 in. diam holes on standard panel mounting centers, the switch will accommodate panel thicknesses of from 1/16 to 1/4 in, in increments of 1/32 in. Interchangeability of units and their components provides for flexibility and adaptation to multiple assemblies. Switches can be obtained in flushplate or box-type mountings to permit combinations of individual pushbutton, selector or pilot light assemblies. Single and double pole contact blocks can be used interchangeably with the several different types of pushbutton and selector operator heads. Interchangeable collars are supplied in three different heights to enable changing from a flush to extended type button by merely changing the collar. Buttons are available in an assortment of colors to conform with standard codes.

Other design features of the new switch include plastic shields to enclose the large silver alloy contacts, unit-molded main contact block to assure alignment and simplify assembly, fully guided plunger of crosshead design to prevent binding, and oil-resistant rubber diaphragm in operator head to seal out oil, water and dust. Electrical Mfg. Div., The National Acme Co.

Circle 36 on postcard for more data



Namco Gold-N-Ring pushbutton switch with flush head operator and one NO-NC contact block; and a four-button control station



Double - tracer lathe available from Hydra-Feed Machine Tool Corp. can be supplied with either right or left-hand silides, or combination of both. Coupled with rear carriage tools for roughing cuts, these machines reportedly combine a short machining cycle with high quality finishes.

#### **Double Tracer Lathes Rough and Finish Turn**

AXLE shafts, motor shafts, camshafts, etc., can now be handled in a single setup on double tracer lathes recently introduced, according to an announcement. The top arrangement mounts two tracers in a variety of combinations for highest efficiency on any particular installation. Several basic tracer combinations are possible: Either right or left-hand mounting of tracers, or combination of both: tracers mounted in tandem with a single hydraulic feed cylinder; individual feed cylinders supplied for each tracer. Greater accuracy and time-savings are said to result because the workpiece does not have to be handled and rechucked twice for separate roughing and finishing operations. The machining cycles are automatic and can be preselected for the particular operation involved.

Two different machining sequences are possible: (a) traversing rear carriage operates first to perform multiple tool roughing operations, after which the top carriage tracer slides move in for template controlled tracer turning; or (b) top carriage-mounted tracers perform their turning, after which the rear slides are used for form tool grooving and undercutting operations.

Three basic sizes (HDT-8, HDT-12 and HDT-16) of double tracer lathes are available, with the swing over carriages being 11½, 13 and 17 in., respectively. Length of parts that can be handled on standard machines is 24, 36 and 48 in., for the three models. Either a constant spindle speed or a variable speed drive for

constant surface cutting speed can be supplied with these lathes, depending on the requirements of the particular installation. Hydra-Feed Machine Tool Corp.

Circle 37 on postcard for more data

#### Industrial Controls

Announcement of a diversified line of package industrial controls, said to provide automatic yet flexible monitoring and control of virtually any chemical or mechanical condition that can be measured electrically, has been made. Included among the functions that can be controlled by the instruments are voltage, current, torque, timing, pressure, temperature, liquid level, speed, depth, light,

sound, and deflection. The controls are effective over a variety of ranges for each function. Sensitivities begin with zero to five microamperes or zero to five millivolts. Normally the units operate on d-c, but may be adapted easily to a-c in most cases.

Depending on the circuitry, the units will initiate desired control action either when an increasing or a decreasing signal reaches a preset point. Units also are available with both high and low limits. The controls are of the indicating type, calibrated in whatever units are applicable, with one pointer giving a continual reading of the signal from the operation being monitored. A second pointer may be turned to any place on the dial-usually a 95-deg scale arc-to fix the allowable signal limit. Control accuracy is held to within two per cent of dial settings.

Either on-and-off or locking (shutoff) control action may be selected on
most units. With on-off, the device
takes control action when the signal
reaches the preset limit, but continues
to test the signal periodically. If a
permissible signal level is reached,
the unit stops its control of auxiliary
equipment but continues to indicate
the signal. With locking control, the
device must be reset manually each
time the signal reaches the control
point.

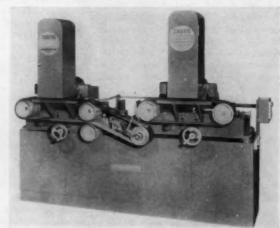
The controls are available in other single or multi-meter models, depending on whether one or several signals must be monitored to provide complete control. Tipp Manufacturing Co.

Circle 38 on postcard for more data

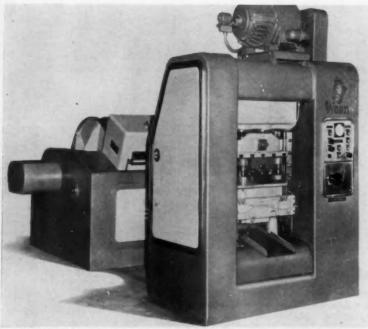
#### "Straight-O-Matic" Model Offers Double Side Grinding

Near automation in the grinding, polishing and deburring field, is said to be made available with the Model 304C2 double side grinder. Incorporating a turn-over transfer unit, between conveyorized abrasive belt heads, it will grind, polish or deburr both sides of a workpiece in one handling. The abrasive belts used are 4-in. wide by 54-in. long. (Curtis Machine Corp.)

Circle 39 on postcard for more data



## PRODUCTION EQUIPMENT



Wean "Flying Press" uses a new operating principle for increased production

#### **High-Speed "Flying Press" Ups Production**

U TILIZING a different principle of operation, a new series of "Flying Press" will reportedly bring economies and much higher production rates in many installations where it is applicable. Listed models range from 40 to 200 tons, with strokes of from 150 to 450 per minute max, handling coil widths of 14 to 48-in. It is understood, however, that the largest unit is 300 tons; also that one

model can be run at 600 strokes per minute at feed lengths up to nineinch, equal to 5400 ipm. Progressive dies can be used with this equipment.

The press has a movable upper and lower platen which synchronizes with the forward motion of the strip during the time in which the work is performed. A set of feed rolls is geared into the motion of the dies so that the stock is fed continuously,

rather than on a start-stop basis, thus permitting higher strip speeds. The length of index is infinitely adjustable within the given range. A mechanism is incorporated for lowering the bottom die out of engagement with the upper in a controlled sequence of operation, thereby multiplying the effective feed range. The press has neither a clutch nor brake, cutting down maintenance. Bearings are lubricated by a pressurized oil system. The machine is balanced and operation is said to be almost completely without vibration.

A decoiler has been developed especially for use with the press. The coil is supported on two narrow face cones incorporated in large diameter disks which act as side guides for the coil. These disks are supported on two rollers and are brought into contact with the coil by a handwheel. A lift is provided which can be raised or lowered by a motor-operated jack to center the coil on the cones. A leveler consisting of a set of entry pinch rolls and four work rolls is incorporated in the decoiler for removal of coil set. This leveler is driven by a motor and feeds the strip into a loop before the press.

The press control panel is arranged for manual or automatic operation. Manual operation is intended only for die setting and strip jogging operations preliminary to actual running of the machine. An indicator showing press strokes per minute is provided. A dancer roll system for control of loop between decoiler and press is also provided. Wean Equipment Co.

Circle 40 on postcard for more data

#### Spot Weld Sealer

Parwell spot weld elastic sealer compound, recently announced, is said to reduce electrode wear caused by the formation of copper oxide which occurs when the tip comes in contact with ordinary spot weld compounds. Increase of electrode service life by 500 per cent and more is reported by the company.

The compound provides watertight, corrosion-free joints with minimum resistance to the welding current, it is said. Satisfactory welds are made with the spot welder set to standard conditions of 10,000 amp, 10 cycles. Tests indicate that more than 850 welds can be made directly through the compound before pitting becomes noticeable. The sealer may air dry

up to 96 hours before welding without affecting either weld or sealing quality. The compound will reportedly adhere without running or sagging on oiled sheets, and hold its form to temperatures of 350 deg for 45 minutes. It may be applied with conventional pressure compound equipment at 60 psi.

As the material is said to remain unaffected by bonderizing solutions and hot water, it may be used on production lines where degreasing and bonderizing equipment is used. Spot welded panels sealed with Parweld have shown no corrosion after 100 hour salt spray or high-humidity chamber tests. Recommended procedure is to apply a bead to one faying surface of the joint sufficient so that

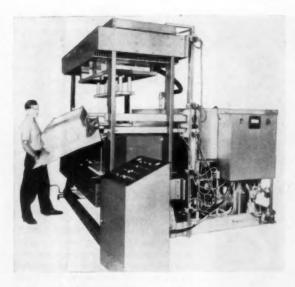
the compound flows out to the edges as the weld is made. Parr Paint & Color Co.

Circle 41 on postcard for more data

#### Shuttle Valve

Two models of a new shuttle valve have been introduced. Offered in 1/4-in. and 3/8-in. pipe sizes, length dimensions are 1-1/4 and 2-3/8-in. With two inlets and one outlet, the brass unit can be used for either air or certain types of liquids. Weighing only 14-oz, the valve has a differential sealing pressure of 15 psi and operating pressure of 15 to 125 psi. Temperature range is up to 175 F. Ross Operating Valve Co.

Circle 42 on postcard for more data



Star plastic forming press is available in four standard sizes with mold areas 36 by 48in. to 60 by 96-in. Special adaptations are obtainable. Stroke of upper platen is 27-in.; lower 34-in.

#### Forming Press for Plastic Fabrication

FORMS that are hard to fabricate due to shape or material thickness can be processed easily with a new forming press called the Star, according to a recent announcement.

New techniques incorporated in this machine are said to include: snap back forming, pressure forming, mechanical forming, and vacuum forming and trimming in one operation. Unlimited applications and combinations of forming are stated to be possible.

The basic operations include the automatic withdrawal of a heated plastic sheet from an enclosed oven. The machine is equipped with counteracting platens which provide for plug assist or hold back directing control on the plastic sheet during forming operations. Each platen is capable of carrying a mold or helper and performs a complete fabricating operation. Vacuum may be applied through either or both platens simultaneously depending upon forming technique desired. The sheet is securely clamped in a central position between the two platens. Each platen is electrically-driven and individually

Automatic cycling operations are pre-set in special timers. Loading and unloading operations may be by manual means, from extruder, or blanks automatically fed and automatically removed after forming. Air pressure required is 100 psi, electric source 220 or 440-v, three-phase, 60-cycle. Comet Industries.

Circle 43 on postcard for mere data

#### **Compression Tester Graphically Records Data**

E NGINEERING test data is provided by a large compression testing unit designed and built for laboratory use. The unit features an electronically-controlled graphic recorder, which plots an x-y coordinate curve of deflection versus loading. Other features are variable speed motor control for adjusting the speed of movement of the upper platen from 0.2 to 40 ipm, and the 72-in. stroke of the upper platen that provides ample working space between the platens.

The announcement points out that the particular unit illustrated is used for conducting tests on automobile front end assemblies, but that it is adaptable for performing most types of compression tests. It has a capacity of 81/2 tons.

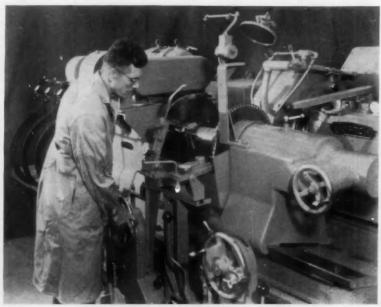
Compression tests are performed by a 70 by 48-in. upper platen. Movement of the platen is controlled by the technician from an operating station mounted adjacent to the scale indicating mechanism. Scale weight reading and the movement of the platen are transmitted to the recorder for plotting in graphic form for easy analysis. Toledo Scale Co.

Circle 44 on postcard for more data



Toledo Scale Co. compression testing unit for front end assemblies

## PRODUCTION EQUIPMENT



Norton 30-in. Type LCTU semi-automatic cylindrical grinder

#### Cylindrical Grinder for Large, Light-Weight Parts

A CYLINDRICAL grinding machine for precision grinding of large, relatively light-weight workpieces was recently developed. The 30-in. Type LCTU semi-automatic cylindrical grinder is available in work lengths

of 48, 72 and 96-in., and will handle work up to 30-in. diam.

Wide tables and ways are built into the machine to give rigid support to the work. Automatic or manual wheel feed settings are speeded by means of "click-count" wheel feed index, with which feed increments as fine as 0.0001 in. in work diameter reduction may be set without visual attention. Wheel feed is accomplished by means of a rotating screw type automatic wheel feed mechanism.

The automatic cycle is actuated with a single lever, located at the operator's position, and terminates either manually or by an electrically-timed control. A jogging lever permits fractional rotation of the work to the most convenient position for loading or inspection.

Operation is also said to be simplified by a preset table truing and grinding speed control feature. This permits maintenance of separate table speeds for truing and grinding as set from the first workpiece. It provides either speed by short movement of the table control lever. Work rotation start-stop and coolant flow cycle are controlled automatically with the grinding cycle; or manually, by a selector switch.

Optional accessories for the machine include locating devices, automatic wheel truing, automatic compensation of wheelhead setting after truing, and a lever-operated device which moves the grinding wheel into a shoulder to be ground. Norton Co.

Circle 45 on postcard for more data

#### New Automatic Arc Welding Equipment

Two new models of West-ing-arc automatic welding equipment are now available for CO<sub>2</sub> gas metal-arc

or submerged arc d-c welding Each model consists basically of a heavyduty welding head, control, operator's

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HEALAZ

Heavy duty welding head, control and operator's remote control station for new West-ing-arc automatic welding equipment.

remote control station, and interconnecting cables. The equipment is said to provide uniform bead contour and crater elimination at high welding speeds.

As air-cooled units they require no cooling water. Inching of the wire, flux damping, and arc starting are performed automatically with the Model SA-40A, and manually with the Model SA-40. Front-mounted dials permit quick and accurate setting for arc voltage and current. Controls are housed in a NEMA type 12 dust-tight enclosure and conform to JIC standards.

The welding head is capable of driving wire diameters from 5/64 to ¼ in, at speeds up to 300 ipm. The head motor and gear train enclosures mount to form a single cylindrical case mounted on a universal supporting frame. Two manual adjustments permit the head to be rotated 360 deg in two planes. Westinghouse Electric Corp.

Circle 46 on postcard for more data

AUTOMOTIVE INDUSTRIES, November 1, 1956

#### Hydraulic Fluid

A " economical new "snuffer" type hydraulic fluid whose fire-resistant qualities prevent it from burning on contact with flames, heated metal surfaces or molten metal, has been introduced under the trade-name Irus Fluid 902. A special formulation of water, petroleum oil and emulsifying agents, the fluid is said to be particularly suitable for use in industries where hydraulic leaks or line ruptures would be immediate fire or explosion hazards.

The fluid reportedly eliminates the possibility of combustion by releasing its water content as a protective steam blanket to quench fire.

Despite the water in its composition, the fluid is said to possess all of the petroleum hydraulic oil characteristics vital to proper functioning of hydraulic-operated machinery. According to company engineers, it replaces any conventional mineral or synthetic oil system, and can be used without modification of lines, pumps. valves or cylinders. Shell Oil Co.

Circle 47 on postcard for more data

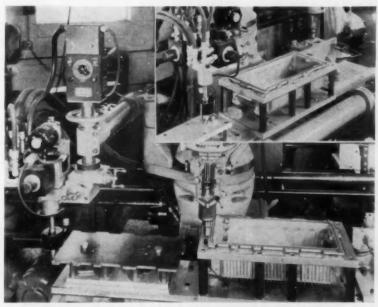
#### **Impact Socket**

To facilitate fastening operations, a new fast-lead type of impact socket that has a specially-designed broached opening for fully engaging the nut in one-sixth of a turn, almost instantly upon contact, is now being produced. It is said that when using these sockets it is not necessary to start and stop the power tool for each operation, nor is it even necessary to hesitate before the socket makes initial contact with the nut. Single or multiple power tools may be operated centinuously. The sockets are being offered with hex openings ranging in size from % to 1-in. The Apex Machine & Tool Co.

Circle 48 on postcard for more data



Apex fast-lead impact socket



In the application of the Turchan Hydro-Magnetic tracer shown above, four contoured sides and one end of a magnesium casting are finish machined and the top surface is grooved by merely swinging the tool head to the new position

#### **Automatic 360-Degree Tracer Control System**

Called the Hydro-Magnetic, a new tracer is a magnetic sensing type stylus by which a closed two-dimensional or 360-deg contour is reproduced automatically. No control action is said to be required on the part of the operator other than predetermining maximum feed rates. The unit features an adjustable tracer and feed speed range that remains constant along any 360 deg contour during tracing operations, resulting in a highly uniform surface finish.

Adaptable to any standard milling machine, the tracer control movements to saddle and table are through hydraulic cylinders replacing the machine's present feed screws on table and saddle. The tracer valve is mounted in a vertical plane in direct relationship to and parallel with the axis of the vertical spindle. The tracer is mounted on a swivel type overarm which provides a wide range of setting between the tracer and the vertical spindle to accommodate the largest of workpieces that can be readily machined within the conventional travels of these mills.

The tracer valve is equipped with a built-in selector that enables the operator to use the valve as an automatic 360 deg pencil-type tracer control. This feature is said to be important because it allows the operator to machine pockets of a predetermined depth, using an oversized tracer stylus under hand control and then finish out the periphery of the pocket utilizing the automatic 360 deg control feature. The sensitivity of the tracer stylus in contact with the template results, it is stated, in repeated accurate duplication and long template life. Turchan Follower Machine Co.

Circle 49 on postcard for more data

#### **Operatorless Tractor**

THE manufacturer of the Guide-O-Matic electronic industrial tractor has announced a new optical guidance system which requires only a painted line or a white tape on the floor to transmit guidance to the tractor. Light emanating from a small, low-powered bulb in the sniffer box reflects from the white tape or paint and actuates photo-electric cells in the box to steer the tractor in the direction of the line.

Company engineers state the optical system is compatible with present tractors which follow wires in the floor, the equipment used being exactly the same except for the sniffer box itself. Barrett-Cravens Co.

Circle 50 on postcard for more data

# New B&D HEAVY Impact Wrench hits maximum torque in 6 seconds!

So rugged we dare offer a year's FREE SERVICE certificate!

In a grueling torture test, the *Power-Built* Black & Decker Heavy-Duty Impact Wrench ran for 500 hours of continuous operation without a breakdown—and was still going strong. Our special *free* service certificate is extra proof of its ruggedness. Yet this tool is so speedy, it hits maximum torque when other impact wrenches are just warming up.

Ask your B&D distributor today for a free demonstration, or write: The Black & Decker Mfg. Co., Dept. 1611, Towson 4, Md.

★ It costs less to maintain...
lasts longer...runs cooler!

No other manufacturer DARES MAKE THIS SPECIAL OFFER!

Every B&D Impact Wrench is covered for one full year by a free service certificate. It protects you against all maintenance costs resulting from normal use!

Packed with Advanced Features!

- Positive-Action Reversing Ring protected from accidental operation by stationary end cap.
- 2. Absorbs Shock—patented armature construction.
- Reduced Operator Fatigue—pistol grip handle and perfect balance provide maximum comfort.
- Lower Maintenance Costs—all mechanical parts are ruggedly constructed for longer service life.
- Plus Twice The Airflow of Comparable Tools. Can't Stall or Overload. Uniform Output. Rated above 120 Ft. Lbs. Torque.

Look in the Yellow Pages under "Tools - Electric" for Negrest Distributer

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Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

#### FREE LITERATURE

3

#### Circular Saw

Bulletin 75, four pages, covers the No. 00 Series circular sawing machine, designed for precision cutting off of small diameter metals. Motch & Merryweather Machinery Co.

#### **Friction Materials**

"Industrial Friction Materials," a 16-page illustrated booklet, covers brake blocks, linings, and clutch facings for heavy-duty equipment. Johns-Manville.

#### **Audio-Testing**

Bulletin 1126, four pages, discusses the principles of audio testing of gears, and describes electronic sound testers that may be used directly in automated lines. Michigan Tool Co.

#### Control Elements

Bulletin GEA-6317, twelve pages, covers control devices built to JIC standards, including a machine tool relay, oil - tight pushbutton, solenoid, limit switch, magnetic starter, plugging switch, and pneumatic timedelay relay. General Electric Co.

#### **Industrial Timers**

A 20-page booklet gives application data on industrial time controls, including manually pre-set timers, cycle repeating timers, dual cycle repeaters, time delay relays, and automatic reset timers. Paragon Electric Co.

#### **Plastic Pipe**

Flexible polyethylene plastic pipe and fittings are described in Bulletin CE-57, eight pages. Also included is a chart which lists many common industrial liquids and specifies which of these may be safely carried. American Hard Rubber Co.

#### Truck Casters

Catalog K40, 68 pages, gives specification data on a line of industrial truck casters and wheels. A special section includes information on hand trucks, drain racks, lift hacks, platforms, and dollies. Bond Foundry & Machine Co.

#### **Gating Components**

A four-page catalog tabulates standard ceramic gating units, such as strainer cores, splash cores, pouring tubes and elbows. Universal Clay Products Co.

#### **Overheat Detectors**

Bulletin MC-134, four pages, deals with a newly-developed line of thermistor overheat detectors for aviation service. Fenwal Inc.

#### Crane Scales

An eight-page catalog covers a line of crane and hoist scales in capacities of from 0-500 to 0-200,000 lb. Hydroway Scales, Inc.

10

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After Jan.

**Rotary Cutting Tools** 11

A line of solid carbide end mills. rotary files, and miniature cutters is listed in an eight-page booklet, which also explains their use for scale and flash removal, blend and twist welds, deburring, countersinking and chamfering. Elgin National Watch Co.

Vibration Control 12

Bulletin K7A, eight pages, explains the theory and purpose of machine tool vibration control, and includes illustrations of machine tools mounted on isolation units. Korfund Co., Inc.

Magnetic Cores

Technical Bulletin MM-1, six pages, discusses the operation of rectangular-loop ferrites in a random-access coincident-current magnetic core memory, and the system requirements with which the designer is faced. General Ceramics Corp.

**Phosphate Coatings** 

Six-page folder covering a line of phosphating and metal protective coating materials, includes a reference chart which lists recommended uses, the metals that can be coated. coating weights, and basic operational cycles. Turco Products, Inc.

**Thermostats** 

15 Physical specifications, performance data, temperature ranges, and other pertinent information on a line of precision industrial thermostats are contained in Catalog MC-135, issued by Fenwal Inc.

**USE THIS POSTCARD** 

**Investment Casting** 

A 22-page booklet reviews the development, operation, and applications of the Shaw process of precision investment casting. Write on company letterhead to Dept. PR-10, Shaw Process Development Corp., 80 Shore Road, Port Washington, New York.

**Recording Paper** 

An eight-page oscillographic recording brochure on "How to Improve Dynamic Testing," covers the proper application of Lino-Writ photo-recording papers. E. I. du Pont de Nemours & Co.

Small Speed Reducers

Speed reducers with a maximum power output of 0.1 hp at the low speed shaft and an anti-backlash feature are covered in Bulletin 98, four pages. Metron Instrument Co.

18 Conveyor Pulleys

Catalog CP-80 gives detailed specifications on conveyor pulleys designed for package, production line, portable, and general conveyor systems. R. & J. Dick Co., Inc.

Silicone Rubber

19

16

A four-page selector, designated AD 24 E, gives the properties and facilities selection of the proper silicone compound or gum from among a group of synthetic elastomers. Silicone Products Dept., General Electric

**Retaining Rings** 20

Specifications for a line of opentype, internal, and external retaining rings are listed in a 12-page catalog issued by Industrial Retaining Ring

Chucks

Catalog 66, 91 pages, lists a complete line of manually-operated chucks by a simplified method for ease of selection. Address request on company letterhead to The Cushman Chuck Co., Hartford 2, Conn.

**Hydraulic Valves** 

Catalog H-12, 92 pages, includes performance data and typical installations of a line of oil hydraulic valves for controlling fluid power in the operation of cylinders and motors. Address request on company letterhead to The Commercial Shearing and Stamping Co., 1775 Login Ave., Youngstown 1, Ohio.



# STEEL

In many cases, the life of expensive cutting tools was increased 100%.

Often the finer finish of Copperweld Leaded Steels reduced the final de-burring and polishing operations. Truly, Copperweld Leaded Steel is the steel with "built-in productivity."



COPPERWELD STEEL COMPANY

Steel Division . Warren, Ohio

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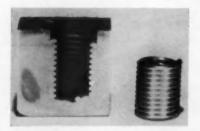
# NEW

## PRODUCTS AUTOMOTIVE - AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

#### Wire-Thread Insert

Developed for high-speed casting of integral threads, a stainless steel insert was recently introduced for applications where durable, corrosionresistant threads are required in cast metal parts. While the use of inserts



to provide threads in various materials is not new, this wire-thread insert, evolved specifically for sandcasting operations, is a late development. Differing from the standard insert, the new insert is tightly wound to prevent the flow of hot metal into the female threads and maintain correct thread pitch in the casting. This characteristic is shown at the right in the illustration. At the left is a cutaway section of a finished casting showing the bonding of the insert to the cast metal. Shrinkage of the cast metal on cooling is compensated for with a slightly oversize coil.

In foundry use, the insert is placed directly on the mold on sand cores and the molten metal flows around the exterior, forming a fusion bond. After casting, the sand is removed from the insert by blast cleaner, leaving the threads ready for use. Insert strength is said to exceed the strength of standard steel bolts. Heli-Coil Corp.

Circle 60 on postcard for more data

#### Solvent-Resistant Rubber

Known as Silastic IS-53, a new fluoro-silicone rubber is said to have outstanding resistance to swelling in contact with jet fuels, high aromatic oils and other solvents, coupled with hardness, tensile strength and elongation comparable to conventional silicone rubbers. As an illustration of its resistance to jet fuels, O-rings made of this material swelled only 20 per cent on test immersion for 70 hours at room temperature in an aromatic test fuel, MIL-H-3166 Type III. Conventional silicone rubbers swelled over 200 per cent under the same test conditions.

The announcement further states that its use will be limited for the present to essential aircraft applications; pointing out that its properties are most needed in O-rings and other seals where rubber must perform over a temperature range from -80 to over 400 F and still resist swelling and attack by gasoline, jet engine fuels, hydraulic fluids and engine oils. Dow Corning Corp.

Circle 61 on posteard for more data

#### Self-Aligning Nut

For fastening applications involving non-parallel surfaces, a new line of counterbored, self-aligning, hexagon locknuts has been designed. These fasteners are said to offer savings by eliminating machining, milling, individual selection of tapered shims or



other preparation of forgings presently used, to obtain the required parallel bolting surfaces.

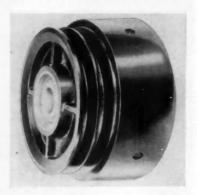
The nut, varying the ball joint principle, has a base with a convex seat which mates with an alloy steel concave seat washer. The nut tilts eight degrees in any direction from centerline to compensate for angular misalignment of fastening surfaces. Tightening the bolt in the normal manner seats the nut in the base and adjusts it to the proper angle.

Thread sizes currently designed for the Type LH2935 hex locknut are 10-32, ¼-28 and 5/16-24. Elastic Stop Nut Corp. of America.

Circle 62 on postcard for more data

#### **Toggle-Action Clutch**

Featuring a disengagement speed approximately 400 to 500 rpm lower than the engagement speed, a new



clutch has what is said to be an exclusive lock-in toggle action. The manufacturer describes this feature as a decided advantage because the wide differential allows the engine to idle at a satisfactory speed without slippage at relatively low operating speeds, and provides for greater load capacity in proportion to clutch weight.

Called Tog-O-Loc, the new clutch is available for use on a variety of engines in the 10 to 50 hp range. Long life with trouble-free performance is claimed by the manufacturer due to large friction area and simplified construction. Salsbury Corp.

Circle 63 on postcard for more data

#### **Couplings for Ductwork**

Developed for critical connections in jet aircraft high pressure bleed air ductwork, a new line of couplings called Dubl-Lock features a clamp with a double locking safety catch. They are designed for such applications as high pressure air ductwork passing through the cockpit and cabin areas. The new safety feature adds only 0.004 lb to the weight of coupling.

Should the locking bolt shear or



otherwise fail, a barbed tang prevents coupling failure by maintaining the seal. The tang is drawn into locking position when the bolt is tightened. It releases with thumb pressure when desired after the bolt is unlatched.

The couplings are available in 13 sizes. They are said to be as much as 40 per cent lighter than present designs, with actual weights ranging from 0.40 lb for the two-inch to 0.96 lb for the six-inch size. Design specifications call for continuous use with pressures of 250 psi and temperatures of 750 F, although performance in tests has exceeded these figures. Janitrol Aircraft - Automotive Div., Surface Combustion Corp.

Circle 64 on postcard for more data

#### **Epoxy Resin Adhesive**

A one-part epoxy resin adhesive that provides high shear strengths without the necessity of adding an accelerator or catalyst is now available. Designated as EC-1386, this adhesive is said to provide unlimited working life, a unique feature with adhesives of the epoxy resin type.

It is designed for metal bonding over a service temperature range of -65 F to 250 F. It gives good adhesion to brass, steel and aluminum, and can be used for industrial and aircraft applications where exceptionally high shear strengths at room temperatures and 180 F are required. No volatile by-products are given off during the curing cycle which makes it useful for bonding impervious surfaces.

Adhesive EC-1386 offers good flexibility, providing high-strength bonds that have added bending strength and resistance to cracking or shattering under shock or bend loads. High-strength bonds are obtained by curing this adhesive at temperature in the range of 350 F. For example, average share strengths of 4670 psi at room temperature and 4630 psi at 180 F are obtained on a ½-in. 24ST3 alclad aluminum bond cured 60 minutes at 350 F under 25-50 psi pressure. Minnesota Mining and Manufacturing Co.

Circle 65 on postcard for more data

#### **Hydraulic Lock Valve**

Creepage of loaded cylinders in hydraulic lift systems because of seepage is said to be prevented by the use of a new lock valve recently developed. The purpose of the WV lock valve is to supplement the seal on a standard directional valve to provide a positive lock of the cylinder until the flow is deliberately reversed. It is applicable to hydraulic systems on tractors, road-building equipment, lift trucks and machine tools, among others.

The valve can handle up to 20 gpm and will reportedly operate satisfactorily up to 1500 psi. It has two valves, a check and a relief; with poppets made of nylon. Construction is said to offer minimum restriction when operating the check valve. Approximately 1200 psi is required before reverse flow is started; when once started, return pressure drops to about 150 psi. The unit can be located in the line supplying either the head end or the rod end, or both. Webster Electric Co.

Circle 66 on postcard for more data

#### **High-Heat Paint**

An aluminum paint said to be capable of withstanding temperatures up to 1700 F, has been introduced. Termed "Extra High," it is composed of a clear silicone base with a special aluminum flake pigment. The combination air dries to a bright finish in about 30 min: then when heated is said to virtually fuse with

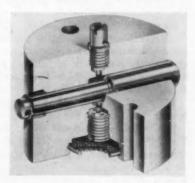
the surface upon which it is applied.

According to the manufacturer, the paint forms a metal coating that resists moisture, corrosion, mild acids, alkalis and industrial fumes. It is recommended for use on condensers, heat lines, ovens, compressors, cylinder heads, mufflers, exhaust manifolds, etc. Application can be by either brush or spray. Chem Industrial Co.

Circle 67 on postcard for more data

#### **Pump for Lubricating**

Continuous lubrication of a bearing or series of bearings may be provided by a new piston pump that has only one moving part. Described as a rotating pump with an oscillating piston, the unit consists of a cylindrical housing, about three inches in diameter, containing a horizontal stepped piston. It is designed primarily for lubrication of machines with a vertical drive shaft, and is attached di-



rectly to the bottom of such shaft. The pump is mounted on the shaft so that it rotates in a fixed eccentric race within an oil sump; and the ends of the piston, extending beyond the diameter of the housing, ride against the eccentric race. The resulting oscillating action of the piston draws oil into the pump, and feeds it under pressure into the bore of the drive shaft and thence to the bearings.

Initial installation of the pump was on a vertical gear reducer unit, for supplying lubrication to a series of bearings. It is said to be applicable to any type of vertical shaft machine or equipment where the pump can be located in a built-in oil sump. The unit can feed varying amounts of oil, the rate of oil flow being determined by length of piston stroke, piston diameter, and rpm of pump housing. Bijur Lubricating Corp.

Circle 68 on postcard for more data



### AUTOMATIC CONTROLS PRODUCTION—VEHICES—AIRCRAFT

#### By Samuel Cummings

ACHINE tool builders set up their machines and operated them at a series of two-day conferences on automation, sponsored by International Harvester Co. at its Manufacturing Research Building, Chicago, from Sept. 19 to Oct. 12. Purpose of the conference was to acquaint top company executives with the latest machines available for mechanized production and to show some of them in action.

Personnel from each IHC division, from division managers down to production engineers, were shown advanced machines in operation, and representatives of the exhibitors were on hand to explain their production possibilities. More than 400 people from IHC, in groups of about 50 each, attended the sessions.

The conference itself featured talks on automation by prominent men in the field. Subjects covered were:

A Good Look at Automation, Dr. H. B. Osborn, Tocco Div., Ohio Crankshaft Co.; H. E. Nason, Westinghouse Electric Co. Mechanics of Automation, Dr. G. A. Nothmann, Armour Research Foundation: W. D. Bobco, Armour Research Foundation. Servo and Feedback Principles Explained, T. E. Johntz, General Electric Co.; F. L. Kahl, General Electric Co. Automation—An Aid to Quality Control, L. O. Heinold, Jr., Federal Gage Co.; R. A. Souler, Federal Gage Co.; J. D. Broatch, Pratt & Whitney; Prof. H. R. Swensen, Illinois Inst. of Tech.; J. R. Harrington, DoAll Co. Movement of Materials, F. H. Wiley, Gen'l Supv., Materials Handling Research, Int. Harvester Co.

W. D. Bryson, Manager of Manufacturing Research, I. H. Co., was chairman at the conference. R. C. Archer, vice-pres., Manufacturing, and A. E. W. Johnson, vice-pres., Eng., gave the keynote talks at the first meeting; H. E. Gottberg, Mgr. of Mfg., Motor Truck Div., at the second; Dan Chimenti, Mgr. of Mfg., Farm Tractor Div., at the third; C. N. Mc-Intire, Mgr. of Mfg., Farm Implement Div., at the fourth; R. F. Denney, Mgr. of Mfg., Construction Equipment Div., at the fifth; W. B. P. Brown, Mgr. of Mfg., Canadian Div., at the sixth, and P. R. Nichols, Gen'l Supt., Wisconsin Steel Div., at the seventh.

Automation, it was pointed out, is merely the latest stage in a gradual evolutionary process that had been going on ever since machines were invented. If mechanization were to be defined as "the replacement of human power with machine power," then automation could be considered as "the replacement of human control of production processes with automatic control."

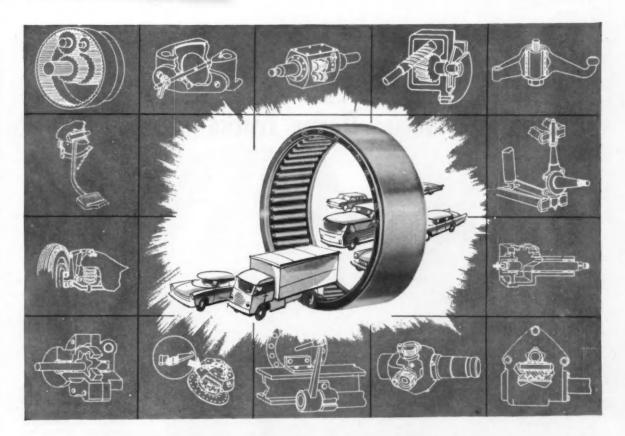
The demonstrations and exhibits included a machinability computer by Metallurgical Products Dept., General Electric Co.; electrolytic carbide sharpener, Firth Sterling, Inc.; grinding of carbide tools, Wesson Co.; automatic assembly machine for breaker arms, West Pullman Works; automatic loading mechanism, Seneca Falls Machine Co.; automatic power saw, DoAll Midwest Co.; automatic grinding, gaging, sorting, The Sheffield Corp.; grinding, Heald Machine Co.; grinding, Landis Tool Co.; honing, Micromatic Hone Corp.; turning on automatic lathe, Sundstrand Machine Tool Co.; automatic gaging and sorting, Pratt & Whitney Co.; automatic gaging, sorting, and feedback, Federal Products Corp.; automatic gear checking, Illinois Tool Works; automatic table positioning, Pratt & Whitney Co.; turning on automatic lathe, Monarch Machine Tool Co.; continuous broaching, Foot-Burt Co.; high speed milling, Sundstrand Machine Tool Co.; turning on automatic turret lathe, Gisholt Machine Co.; high speed drilling, Star Cutter Co.; automated gear cutting, The Fellows Gear Shaper Co.; automatic pinion checking and feedback, The Fellows Gear Shaper Co.; automatic thread roller, The Sheffield Corp.; Cavitron machining, The Sheffield Corp.; punched tape control for machine tools, Tri-Tronics, Inc.; Cypak machine control, Westinghouse Electric Co.; fork trucks, Yale and Towne Mfg. Co.; twe-way radio, Motorola, Inc.; automatic packaging, Packmaster; automatic turning on tape controlled lathe, Gisholt Machine Co.; closed circuit television for watching operation, Allied Radio Corp.; servo action and feedback, Askania Regulator Co.; servo mechanisms, Heald Machine Co.; electrographic detector, W. F. & John Barnes Co.; and automatic computer circuitry, radio-isotope display, turning with ceramic tools, fabrication of powdered metal parts, plastics tooling, MIG-CO2 welding, heat treating, shell molding, and plow bottom assembly, by divisions of International Harvester Co.

#### ISA SHOW

Thousands of electronic engineers and technicians made the long trek through New York City's vast new Coliseum to look at the elaborate array of equipment on display at the International Instrument-Automation Conference and Exhibit. The show, which ran for five days (Sept. 17-21), was sponsored by the Instrument Society of America.

The exhibits included every type of electronic gadget from tricky computers that were used for performing such promotional stunts as playing a Chinese letter game or weighing potential customers and flashing a bunch of vital statistics to an electronic instrument that can measure an electric current of one-thousandth of a trillionth of an ampere.

(Turn to page 118, please)



## TORRINGTON NEEDLE BEARINGS offer the Automotive Manufacturer these advantages

- 1. High capacity
- 2. Small size
- 3. Low cost
- 4. Ease of installation
- 5. Long service life

The automotive industry was one of the first to see the unique advantages of the Torrington Needle Bearing when it was introduced nearly twenty years ago. Today, leading manufacturers of automobiles, trucks and components have standardized on the Needle Bearing to such an extent that it is in use in almost every rotating or oscillating bearing application where compactness, high capacity and ease of installation are important.

The NEEDLE BEARING has been "Performance Proved" in these Major Applications

Universal joints • Governors • Steering gear rollers Steering knuckles • Steering idlers • Power steering Suspensions • Brake camshafts • Brake and clutch linkage pivots • Clutch throw out fingers • Transmissions • Hydraulic pumps • Window lifts and many others.

If some of these applications of the Needle Bearing are new to you, why not let our Engineering Department show you how they can improve the design and performance on your product? See your Torrington Bearing representative or write direct.

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Torrington, Conn.

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### TORRINGTON BEARINGS



Meedle . Spherical Roller . Tapered Roller . Cylindrical Roller . Ball . Heedle Rollers

# Higher Powered Engines Offered in K Series Dodge Trucks



New 900 six-wheeler in the 1957 Dodge truck line is powered by 354 cu in. engine, which develops 232 hp. This model is available with a 38,-000-lb capacity front axle. Maximum gross vehicle weight is 46,000 lb, maximum gross combination weight, 65,000 lb.

R 1957 the Dodge Division is offering the K Series Dodge Power-Giants truck line, which features more powerful V-8 engines, rated at 204 hp for the 100, 200, and 300 models. Front end styling has been improved by the introduction of a new grille and grille panel, new headlamps and parking lights, and front bumpers.

The array of Power-Dome V-8 engines is entirely new, with higher horsepower for the entire group of models. Largest of these, the 354 cu in. displacement engine with twin carburetors, is standard on 900 models, optional on 700 and 800 models with single carburetor. The 331 cu in. engine with twin carburetion is standard on all 800 models; the same engine with a single carburetor is standard on 700 models.

Six-cylinder engines are available, as before, on 100-200-300; 400-500-600 conventional models; 300-500 four-wheel drive models; 300-400 Forward Control; 400-500-600 school bus models. On 100-200-300, and 300-400 Forward Control models, the 230 cu in. engine has its rating upped to 120 hp (115 hp last year), and torque from 201 to 202 lb ft. On the 300,

four-wheel models, the same engine has horsepower upped from 111 to 113.

Three-speed automatic transmissions with pushbutton control are available as optional equipment on 100, 200, and 300 models, as well as on 300 and 400 Forward Control models. Heavier frames are used on 200 and conventional 600 models. An Orscheln hand brake lever is standard on all models except 300, fourwheel drive. Over-center lever action makes it easier to set and release. Brake adjustment, due to normal brake wear, is made by driver, simply by turning the knurled knob at the end of the lever, taking up the slack in the cable.

Air brakes are available as optional equipment on all 600 through 900 models. Larger brakes with increased lining area are installed on 200 and 500 models.

Power steering is made available, at extra cost, on every model in the line (except W500 four-wheel drive) and for the first time on the 300, four-wheel drive models. Ignition key starting is standard on all models.

(Turn to page 133, please)

DESIGNED

FOR

DUTY

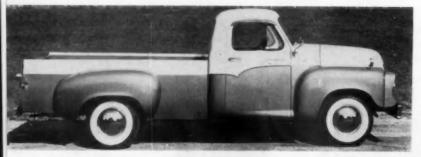


IN

## CLARK

ENGINES

Clark...one of the leading manufacturers using Perfect Circle 2 in 1 chrome rings for service requirements.



The half-ton Transfar pickup is equipped with a 259 cu in. V-8 engine for the first time. The V-8 for this model has a 3 9/16 in. bore and 3½ in. stroke, and is rated at 170 hp.

# Studebaker Adds Heavy Duty Vehicles to New Truck Lines

THE Studebaker Transtar line of trucks, which traditionally covers the light and medium duty fields, will include two-ton heavy duty vehicles for the first time in its 1957 line.

Four engines will be offered for the new line. The 259-cu in., 170-hp V-8 will power the ½ and ¾-ton models for the first time; an entirely new engine, the 289-cu in., 182-hp V-8, will be introduced for the heavy duty units and as optional equipment for the two-ton medium duty model. Optional four-barrel carburetion will increase horsepower on these two V-8 engines to 178 and 192 respectively.

Two six-cylinder engines are available in the light duty models; the 185-cu in., 92-hp and the 245-cu in., 106-hp power plants.

For the new light-duty truck V-8 engine, torque ratings are 250 lb ft at 2600 rpm, an increase of 24 per cent. The new big V-8 engine is rated at 288 lb ft at 2600 rpm. This compares with the top engine rating of 236 lb ft and 156 hp for last year's 259-cu in. engine. Compression ratio is the same for all

Studebaker truck engines this year and is 7.5:1.

In the light duty line, wheelbases of 112, 122 and 131 in. will be available with gross vehicle weight ratings from 4800 lb in the ½-ton model to a new high of 10,000 lb for the one-ton model. Pick-up bodies will be 6½ to 9 ft in length, and stake and platform types will be 8 to 14 ft. The all-steel, double-wall, pick-up body will be retained. A new four-speed synchromesh transmission will be standard on the one-ton, and Studebaker's automatic transmission will be optional on this model for the first time. The automatic transmission has been available only on ½-and ¾-ton units until now.

In the medium duty line of 1½-ton and 2-ton trucks, six wheelbases, ranging up to 195 in. on the two-ton model, will be available. Gross vehicle weights have been boosted to 16,500 lb on the 155-in. wheelbase model, and to 17,000 lb on both the 171-in. and 195-in. wheelbase models. The medium-duty line has a new two-ton chassis and cab model. Other models include

(Turn to page 125, please)

The new Transtartwo-ton models shown here is powered by 289 cu in. V-8 engine, and e quipped with four - speed synchromesh transmission. Maximum gross vehicle weight rating is as high as 19,000 lb.



AUTOMOTIVE INDUSTRIES, November 1, 1956

## **DU PONT ELASTOMERS**

NEOPRENE · HYPALON



#### Longer-lasting neoprenetreated gasket paper cuts costs 50%

Neoprene-saturated paper gaskets offer exceptional economy and longtime service for automotive use. The neoprene-paper gasket shown below prevents wicking and won't swell or shrink with changes in the weather. It holds a good seal against hot engine oil, with 20% less bolt torque. And, best of all, it costs 50% less than previously used materials.

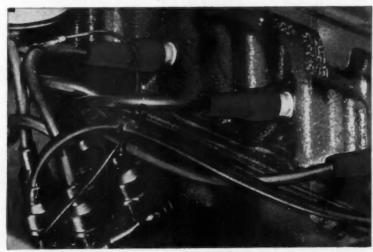
Gasketsmade of neoprene-saturated paper, or of neoprene-asbestos combinations, are widely used around automobile engines in such hot, oily applications as the front cover, oil pump to block, and crankcase breather to block. Two kinds of neoprene-asbestos combinations are used—the well-known compressed sheet and a soft asbestos material in which neoprene latex is the binder.

Gasketing is just one application where neoprene has proved its effectiveness. If you need a resilient material with exceptional resistance to oils, grease, solvents, chemicals, abrasion and flex cracking, it will pay you to investigate neoprene. We'll be glad to send you further information. If you have a specific problem, please let us know in the coupon.



MECHANIC SHOWN replacing a cover gasket on an automatic transmission. Gasket is made of paper saturated with neoprene latex, to prevent wicking and assure dimensional stability.

# Molded spark-plug boots of HYPALON® withstand temperatures of 270°-340°F., are unaffected by ozone



Spark-plug boots of **HYPALON** give outstanding service despite exposure to ozone and temperatures averaging 270°F. in this engine.

Engineers at a leading automobile manufacturing company faced the problem of finding a new rubber material for the spark-plug boots of the company's V-8 engine, New styling had lowered the hood of the car and placed the spark-plug boots too close to the engine exhaust, The engineers knew that ordinary spark-plug boots would not be able to take the punishment of temperatures averaging 270° F, with occasional peaks of 340° F. They would deteriorate and fail to seal out dirt and water from the plugs.

The company decided to test HYPALON

synthetic rubber for the job. HYPALON showed unusual resistance to hardening at elevated temperatures (250°-350°F.) and, according to many previous tests, it was virtually ozone-proof. HYPALON, as a result, has become the standard material for spark-plug boots for this company.

Why not investigate the possibilities of using HYPALON in your design? Check the coupon for additional information on HYPALON's outstanding resistance to heat, ozone, oxidizing chemicals and weathering If you have a specific problem, please write to us or describe it briefly in the coupon.



HYPALON is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



Please add my name to the mailing list for your free publications, "The Neoprene Notebook" and "Facts about HYPALON."
Name

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1 am particularly interested in

# Observations

By Joseph Geschelin

#### Glass Future

Pittsburgh Plate Glass viewed the future of glass progress at the ASBE meeting and found it exhilarating. Developments a few years ahead promise new kinds of tinted glass that can reduce glare and solar heat. There is even a hint that strong glass, transparent steel, may be in the picture to lend structural strength on future designs that contemplate all-glass above the body belt line.

#### Leaf Springs

Amid the welter of new ideas in suspension systems for commercial vehicles, producers of leaf springs offer the idea that the potentialities of leaf springs still remain untapped. Detroit Steel Products says firmly that proper design will assure a soft cushioned ride and adequate load-carrying ability that can vie with radically new systems at competitive cost.

#### Mufflers Tailpipes

Aluminized steel for forming muffler shells and tailpipes was proposed at the recent ASBE meeting. Protected by an aluminum coating the steel parts will have much greater resistance to corrosion failure. At only nominal cost these vital and shortlived parts of a modern car can be given greater durability. It is an important matter to consider in the light of the general trend to dual exhaust systems. The public certainly will react favorably.

#### Aluminum Extrusions

Both Reynolds and Alcoa presented at the recent ASBE meeting a note-worthy picture of aluminum extrusion practice that can well change the thinking of body engineers. Beautifully executed one-piece aluminum radiator grilles finished in a wide range of anodized colors; handsome and durable front and rear bumpers; trunk lids and hoods; fender panels and

fenders are among the practical applications. In fact, the lids, hoods, and fender panels can be readily extruded to include all ornamentation and medallions formed in the base metal. Overall engineering economy is said to be quite favorable, perhaps hitting even lower costs than with formed steel fabricated assemblies.

## Engine Progress

Judging by the comments we hear, a great deal of novelty is anticipated in passenger car engines of reciprocating type. Some may surely evolve into flat or opposed piston designs of relatively short stroke. There is a hint too that radical changes are in store in combustion chambers. We don't have the story yet but apparently developments of importance are in the wind. Regardless of the course of events it is obvious that the present day reciprocating engine has a great deal of inherent vitality.

#### Ball Joints

We guessed right on ball joint suspension. This is something that is being employed across the board in 1957 cars. Chrysler is making ball joints for its entire line of divisions at the New Castle plant. Thompson Products is supplying other makes from the new plant now in operation in the Detroit area.

## ON OUR WASHINGTON WIRE

Federal Government is preparing to spend a hefty \$67 billion plus in 1957, about one-fourth of it for national security. Metalworking concerns, therefore, can expect a significant increase in the dollar volume of business they do with the Government.

Essential design standards for safe motor vehicles will be discussed in detail before a congressional group this month Beginning Nov. 12, the Roberts subcommittee of the House Commerce Committee, now studying highway accident causes, will hear spokesmen for 25 or more national organizations.

Efforts of the Government in recent years to build up large hoards of critical and strategic materials is slowing down. Office of Defense Mobilization has reduced its shopping list from a high of about 80 items to 26.

Recent experience in the synthetic rubber field shows that new industries released from Government monopoly will thrive when treated generously and energetically by private business. During the year that has elapsed since the first 24 of the 27 Governmentowned rubber factories were sold to private business, they have reported high operating rates and are increasing capacities.

Private U. S. foreign investments increased in value by \$2.4 billion during 1955 to a total of \$29 billion, Commerce Dept. announces. Early information for 1956, including announced plans of leading companies, indicates that further large investments are being made.

About \$498 million worth of Government business was earmarked for small concerns in the fiscal year ended last June 30.

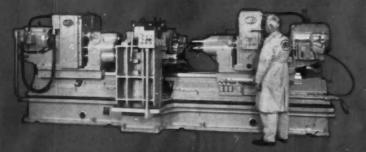
## Drill Bore Face Tap

### ON A MULTI-SPINDLE NATCO

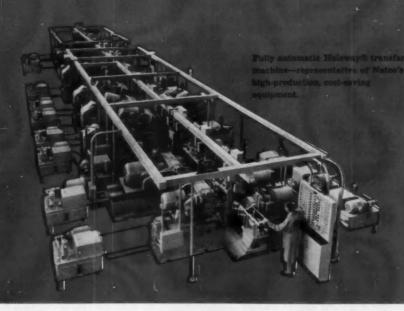
High production or job lot flexibility... Natcos range from small, light sensitive drilling and tapping machines to fully automatic, high-production transfer machines. Special machines designed and fixtured to solve specific production needs.



High-speed, light sensitive, cultiopindic drillers and tappere. Available with adjustable heads, hand and foot feed or hydraulic feed fables, 3-position automatic acture slider and rotating tables for factures.



Way-type horizontal machines for drilling, boring, facing and tapping. Hydraulic feed, automatic inbrication to heads, individual lead screws for tapping, coolant systems with magnetic chip separators.



Call Natco offices in Chicago, Detroit, Buffalo, New York, Boston, Philadelphia, Cleveland and Los Angeles. Distributors in other cities.

NATIONAL AUTOMATIC TOOL COMPANY, INC.

Richmond, Indiana



Steel Operations at Peak Capacity with High Demand Expected
To Continue. Another Steel Price Rise by Next June Predicted

By William F. Boericke

#### **Record Steel Production**

September set a new high record with a production of 10,445,000 tons of steel. This compared with 9,882,325 tons for the same month last year. But in spite of this terrific output, and the continuing demand, consumers are not overbuying. Order cancellations are few. For scarce products, notably structurals and heavy plate there is no relief in sight until well into 1957.

Cold rolled sheets, until recently in quite adequate supply, are in better demand as Detroit returns to the market. It appears that the resurgent motor industry may force the steel mills to operate at over capacity all through the fourth quarter and well into 1957. This will more than compensate for slower demand from manufacturers of farm equipment.

In brief, present bookings are estimated at 110-120 per cent of mill capacity, with order backlogs of 17-18 weeks. Substantial carry-overs will be on the books for the new year. The industry, confronted with usual seasonal demand, has had to struggle to make up the heavy loss of production incurred during the strike period. If demand slackens from any consumer, the tonnage released is quickly snapped up by others.

#### Larger Orders Expected from Detroit

It now appears that the automobile manufacturers were overcautious in placing their orders in advance for their steel requirements for the new models and purchasing agents are re-appraising their inventories anxiously. If the public reaction to the 1957 cars is as favorable as expected, there might be a real squeeze on flat-rolled products.

Stainless steel plants are consistently operating at overcapacity and manufacturers see no let-up in demand. Nickel-bearing stainless is virtually impossible to obtain. Tin plate is scarce, and it is doubtful if the mills can increase deliveries. Washington has ordered a tight export control on steel rails because of short supply. Consumers of plates and structurals want government control on distribution, but there is little chance this will be ordered. Less conversion deals are being made, chiefly because milling and finishing operations are in better balance at most

plants. However, a few deals have been reported at 100 per cent premiums over mill prices.

#### **Higher Prices Expected**

Steel producers are not without their problems, however, in spite of fat order books. Costs are rising, exclusive of the wage increases that followed the strike settlement. Iron ore will cost more after the first of the year if precedent is followed. Because of shipping tie-up during the strike, costly rail shipments are presently called for to make up the loss and meet anticipated demand. High prices for scrap are an added burden, although the peak seems past. Increased prices announced for coal won't help profit margins for steel producers.

Many steel executives appear to have been disappointed over the \$8.50 across-the-board advance in steel prices; the boost was expected to compensate for higher pay for the steel workers. While the pattern set by U. S. Steel was generally adopted by the industry, many officials have been increasingly voluble over the need for even higher prices to cover costs and to provide sufficient profit margin to attract investment funds for the extremely expensive program to expand capacity by 15 million tons in the next three years.

It is almost a foregone conclusion that steel prices will be advanced next June when wage rates are automatically hiked by the terms of the strike settlement. The only question is: will the industry wait that long before taking action? An increase of \$6-\$7 per ton is considered likely. Agitation for an early increase may be intensified if the Government holds to its initial decision not to grant fast write-offs for the steel mills, nor to grant any special tax help on the \$1.4 billion proposed expansion program.

#### Copper Sales Improve

Domestic copper sales for the first half of October improved slightly but were still 20 per cent lower than the daily average last spring. Producers take what comfort they can from the increase over August and September. Sentiment was disturbed by announcement that the British government would release 36,000 tons from the U. K. stockpile. With world production undeniably increasing, the immediate result was a lower price for copper on the London Metal

A leading copper executive has estimated that (Turn to page 106, please)



# A-MP's NEW Button Contact with Insulation Support

**Improved** 

Tensile

Strength

and

**Vibration** 

Resistance

"As seen on the 1956 Dodge"

- Especially designed to give added reliability for automotive and appliance light sockets (applications where vibration can cause the conductor to ground or break at the connection).
- Replaces all button-type contacts presently in use.
- Raised contact section assures positive registry.
- Chamfered edges permit easy rotation of bulb when locking into twin contact socket.
- Applied by high speed A-MP Automatic machines using the revolutionary Keystone Serrated solderless crimp.
- Available in plain brass, or with tin or silver plating, for wire sizes AWG 20 through 16.

Write Today For Further Information

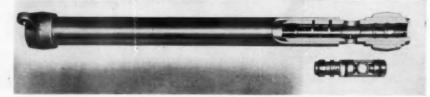
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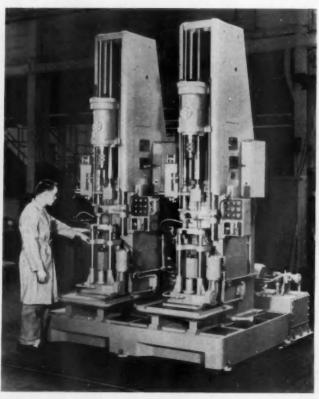
A-MP of Canada, Ltd., Toronto, Canada Aircraft-Marine Products (G.B.) Ltd., London, England Societe A-MP de France, Courbevoie, Seine, France N.V., 's-Hertogenbosch, Holland

## Special **Tooling**



The power steering cylinder with a section cut away to show the actuator valve.

## for Hydraulic Steering Gear Actuator



Double column, Model 740 Hydrohoner equipped with automatic tool expansion and Micro-size control

ORKING with Monroe Auto Equipment processing engineers, Micromatic Hone has developed equipment to Microhone the steering actuator for the hydraulic steering gear after assembly in the cylinder, generating the accuracy and functional characteristics required.

With the use of a special Micromold tool all bow and out-of-roundness are removed. The edges of the control ports in the interrupted bore are made "clean" and sharp so that the piston moves freely without bind or friction. The surface finish and clean-cut, cross-hatch lay pattern permit a perfect moving seal with the hardened steel piston, while providing an excellent means of lubrication.

The machine used is a double column. Model 740 Hydrohoner equipped with automatic tool expansion and Micro-size control.

The valve is first rough-Microhoned to correct all geometric inaccuracies, removing 0.003 to 0.004 in. stock. Then the part is transferred to the second spindle for the finish-Microhoning operation. In removing approximately 0.0015 in. stock, final size and the required surface finish are generated. Diametric size is held to less than 0.0003 in tolerance. Geometric accuracy (out-of-roundness, taper bow) is within 0.0001 in.

#### Harrison Radiator Anticipates Large Demand for Car Cooling

The manufacture of air conditioners for automobiles has developed into one of the fastest growing, big-volume businesses. Western New York has firmly established itself as one of the centers of this relatively new industry.

Harrison Radiator Div. of General Motors Corp., with plants in Lockport and Buffalo, is the country's

biggest producer of car air conditioners. Its output probably accounts for slightly more than half the production in the entire country.

It is estimated that air conditioner installations in cars this year will total 250,000 to 280,000 units. This would put Harrison's output at 125,-000 to 150,000. As recently as 1953, all the manufacturers put together turned out only 28,000.

Harrison predicts that its air-conditioner volume for 1957 cars will increase 50 per cent over this year's output. It also visualizes the business becoming almost as important as car radiators in two or three years.

For the first time, Harrison Radiator in the 1957 model year will supply air conditioners for all five General Motors automobile divisions. Frigidaire formerly made them for the Cadillac and Chevrolet Div. Frigidaire, however, will make compressors for the Harrison air conditioners.

104

AUTOMOTIVE INDUSTRIES, November 1, 1956

# LONG LIFE PISTON

CAST IRON WEAR GROOVE Gand E. Wire Insert Piston before many of the stand of th puts

and lengthens Piston life!

- \* Low initial cost
- Light weight
- **Amazing increase** in piston life
- \* Maintains new engine power and performance

This Gillett & Eaton exclusive steel wire insert is cast right into the alloy piston to make hard surfaces for the top ring groove. Here's an entirely new piston design combining all the advantages of aluminum alloy with the long life of steel wire bearing surfaces in the top ring groove. No noticeable increase in weight. G and E Wire Insert Pistons are real top performers at Low Cost—barely more than ordinary alloy pistons!

When the grooves are machined, the closely spaced steel wire inserts cast in the piston become hard bear-ing surfaces on top and bottom faces of the groove. The wire insert also strengthens the second ringland.

Engines fitted with Gillett & Eaton Wire Insert Pistons maintain new engine power and performance much longer because top ring groove wear is greatly reduced. Build extra volume and profits at Low Cost with Gillett & Eaton Wire Insert Pistons.

GET THE 6 AND 8 WIRE INSERT STORY—Send your sy and requirements—let us quote you.

GILLETT AND EATON, INC. 841 DOUGHTY STREET . LAKE CITY, MINN.



ESTABLISHED 1868

### **METALS**

(Continued from page 102)

domestic mine production will total 1,165,000 tons in 1956, a 12 per cent increase over 1955. Foreign copper production will probably increase 6 per cent this year and this rate will probably be maintained for the next few years because of important new discoveries. Consumption will not increase at this rate if the present 40 cent price is continued. In case of pronounced price weakness there is

a good chance that the Government would start to stockpile copper to support the market, just as it has done for zinc and lead.

Business for the copper fabricators has picked up, but not enough to cheer over. Fabricators say that automobile manufacturers are not yet ordering in volume, but it appears that too much emphasis is being placed on Detroit. Since the auto industry consumes only eight per cent of the total copper produced, an increase or decrease in this small percentage would have only a minor effect on the total figure.

On the other hand, wire and cable sales are holding at excellent levels. The president of a leading telephone cable manufacturing concern reports that new orders can not be filled for 17 months.

### Copper Export

Removal by the Commerce Dept. of export restrictions on refined copper for the fourth quarter is official recognition of the fact that the copper supply is now completely adequate. Scrap exports were also liberalized. At the same time it was indicated that the Government would stop granting rapid amortization for new copper projects.

### Zinc Production Up

The latest zinc statistics show that production thus far this year has exceeded the total shipments to industry and abroad by over 150,000 tons. In September the excess was about 16,500 tons. The surplus has been taken off the market by Government buying for the stockpile.

This has brought the situation into reasonable balance, but the question now worrying the trade is how long it will go on. There is a growing doubt as to whether Government buying will continue beyond the first of the year. The Government's original goal is quite definitely in sight and will probably be reached before the year end. It appears that about 260,-000 tons of the 300,000 needed to complete the stockpiling program will be shipped by the end of September. This includes substantial amounts of foreign zinc and, to a lesser extent, lead acquired by the Government through a barter arrangement for surplus Government - owned farm commodities.

If Government buying ends, there will be a demand for higher tariffs but the chances are against such proposals finding any favor with the Administration. A lower price for zinc would be the logical result; this would mean the elimination of high cost and marginal producers.

### **Lead in Sounder Position**

Statistically, lead is in a sounder position than copper or zinc. Business has held up well. Since comparatively little lead is used in consumer durable products, the metal has not been much affected by lesser demand for such products. Storage batteries and tetraethyl lead, on the other hand, will be used up as long as America takes to the road and these are big outlets for lead.

(Turn to page 109, please)

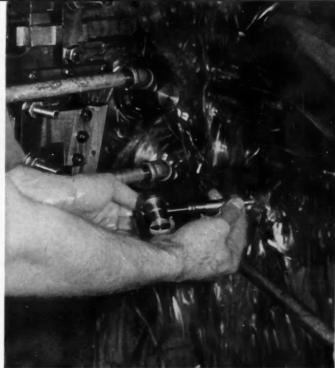


The big caliber derives from the sliding overarm.—The unique square design of this overarm gives much more rigidity with its resultant greater accuracy.—It provides extra range and capacity.—More usable working space.—More versatility in set-up.—More power at the cutter. No adjustment required on overarm and head after use, and no need to re-indicate head after moving overarm. Speed range with 9 changes makes possible the use of high speed or carbide tipped cutters to the best advantage. Many other important features.

Write for Literature.

# INDEX MACHINE CO.





**Black cutting oil** (left) makes close control difficult. Operators dislike dirty operating conditions it creates. Close control is easier and workers are happier with transparent Sunicut cutting oil (right).

# WHY USE A BLACK CUTTING OIL WHEN YOU DON'T NEED IT?

### Sunicut oils give you better visibility without sacrificing machining efficiency.

When trying to maintain close control over machines producing precision parts, operators can be handicapped by "black-oil blindness". It is hard to see the tools, the workpiece, and the finishes. Checking close tolerances is difficult when the graduations on micrometers and gauges are obscured.

Worse still, as the operator sees it, are the dirty working conditions caused by dark oils. His clothes get saturated with hard-to-remove stains, and his hands are black from one end of the shift to the other.

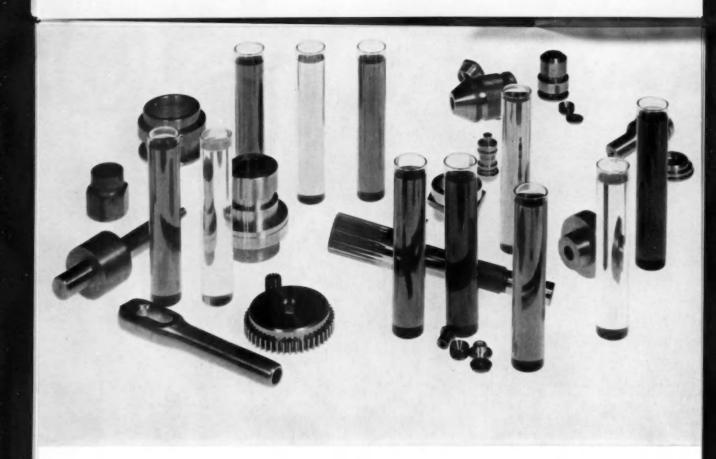
Transparent Sunicut oils help keep your operators happy and will make close control easier ...and transparent Sunicut oils will do the job with no sacrifice in machining speed or finishes.

To get the full story on Sunicut oils, see your local Sun representative, or write Sun Oil Company, Philadelphia 3, Pa., Dept. I-41.



SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL



For any machining or grinding operation...

# THERE'S A SUN OIL THAT'LL GIVE YOU HIGH EFFICIENCY AND LOW OVER-ALL COST

No two machine shops have exactly the same problems when it comes to selecting cutting oils...even when they're running the same job. And, until somebody comes up with the truly universal cutting oil, you can't afford to disregard the importance of oil selection. Here's how Sun can help you.

First, Sun makes a complete line of emulsifying and straight cutting and grinding oils. Second, your Sun representative, backed up by field engineers, has the necessary practical experience to recommend

the oil that will give you both high machining efficiency and low over-all costs.

For the full story about Sun's cutting oils, see your Sun representative...or write Sun Oil Company, Philadelphia 3, Pa., Dept. I-42.



SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

### **METALS**

(Continued from page 196)

Domestic lead mine output for 1956 is estimated at about 340,000 tons, only a trifle above 1955. Lead imports continue to slump, relieving price pressure in this country. Total imports for July were less than 29,000 tons compared with 43,000 tons in May.

### The Metal Show

(Continued from page 72)

Laboratories of Linde Air Products Co., was presented the Samuel Wylie Miller Memorial Medal for researches in the field of welding metallurgy that have contributed significantly to the art of welding. H. C. Ludwig, research engineer, Westinghouse Research Laboratory, was awarded the J. F. Lincoln Gold Medal for the paper judged as the most original contribution to the advancement and use of welding. His winning article was entitled "Nitrogen Effects in Argon-Arc Welding Atmosphere."

Ultrasonics and electronics played a large part in the more sensational aspects of the Metal Show this year. Publicity was given to "spark machining"; the use of ultrasonic sound waves to machine, probe into metal structures, clean parts, or weld metals together; and electronic controls and components for a large variety of operations. The 473 exhibits, having an estimated value of \$6 million, filled to capacity the 250,000 sq ft of the Cleveland Public Auditorium. A number of the many new products and processes on display were described in a preview of the show which appeared in the October 1 issue of AUTOMOTIVE INDUSTRIES. The following developments, observed during the show, are additional representative items and will supplement those contained in the prior issue.

Metallurgical Products Dept., General Electric Co., put on an impressive demonstration showing how a 12-in. diam AISI 6140 steel blank could be faced in less than one minute by teaming up Carboloy 370 carbide with Grade 0-30 cemented oxide. A speed of 0 to 600 fpm was used with the carbide, and 600 to 2600 fpm with the cemented oxide. Depth of cut was 1/16-in., feed 0.0115 ipr.

The Timken Roller Bearing Co. introduced at the show a new graphitic air-hardening tool steel labeled (Turn to page 114, please)

POWER HERCULES...!

BAKER Industrial Trucks rely on . . . POWER BY HERCULES. These rugged trucks demand a compact, heavy-duty power plant. That's why Hercules Gasoline and Diesel Engines were selected as standard in Baker equipment.

The wide selection of Hercules Engines—over 90 models from 3 to 500 H.P.— provides a proper size of engine to meet your power requirements.

For power "tailored" to your needs, specify . . . POWER BY HERCULES.

HERCULES MOTORS CORP. . CANTON, OHIO

### **SAE Transportation Meeting**

(Continued from page 56)

quency of the suspended system decreases according to a curve of diminishing return.

The Goodyear rolling lobe air spring consists of a self contained air spring using a formed piston but without any external container. The construction of this air spring is such that a fixed cylindrical outside diameter is maintained without any other constraining means. The ad-

vantages are simplicity, low cost, extreme flexibility with very low natural frequency. The air requirements are very low because of the small expansion reservoir required. In some cases the complete elimination of the expansion reservoir is possible.

Economics will play a very large part in the selection of the eventual type of suspension for our buses and whether it will be rubber torsion bushings, steel torsion bars, coil springs, leaf springs, air-hydraulic or air springs we can rest assured it will be a good suspension and will result in a comfortable ride for the passengers and a low maintenance unit for the operators.

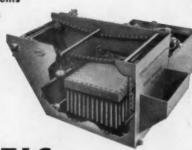
What does the future hold for bus suspensions? It is conceivable that the ultimate will be a power suspension of some type. With gas turbines or free piston engines, excess power will be available for more power accessories, such as a full power suspension which will maintain a bus parallel to and at a fixed distance from the mean road surface. A suspension of this type will require a sensing device and a very fast working follow-up arrangement which will maintain wheel contact with the ground and support the vehicle without changing its attitude so that the passengers are not subjected to any appreciable vertical accelerations.

# TOPS IN AUTOMATIC

- . . . in minimum space requirements
- . . . in maximum flow capacities
- . . . in versatility of application

THE

## Delpark



FILTER-MATIC

TUBULAR SCREEN TYPE FILTER
5 TO 1000 G.P.M. FLOW CAPACITIES

Tubular screens of small diameter manifolded tagether into a common suction header form the high capacity filtering elements for the new Delpark Filter-Matic.

The tubular screens, through which the liquid is drawn, are cleaned by an automatically controlled reverse flow through the screens. Sludge removed drops to the bottom of the tank and is carried out by continuously op-

erated chain driven flights. Filtered liquid is supplied from a reservoir and the supply is not interrupted during cleaning.

Delpark Filter-Matics may be used with precast for which an automatic precoat feeding device is supplied.

Write for more detailed information on this newest development in filtration for industry.



. . . FIRST in Filtration Advancements

INDUSTRIAL FILTRATION COMPANY
19 INDUSTRIAL AVENUE
LEBANON, INDIANA

### Trends in Motor Coach Electrical Systems

By R. H. Bertsche,

GMC TRUCK AND COACH DIV.

It seems that the typical heavy transit coach which will be built, in say five years, will be equipped with an exterior lighting system consisting of four head lamps and the usual corner markers with perhaps two additional amber side markers; the conventional identification lamps; front, side and rear directional signals, together with two tail lamps and two stop lamps. These will have improved photometric characteristics, some may use larger bulbs and they will be mechanically improved to reduce the time required to rebulb.

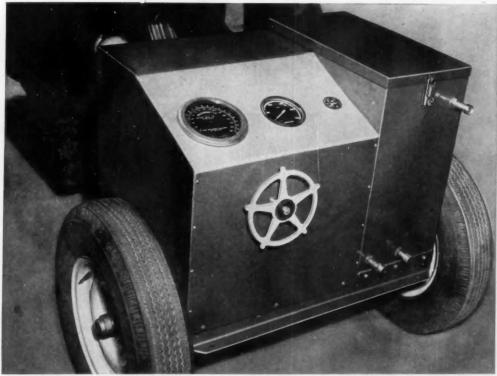
The interior will be lighted by a simplified fluorescent system providing an attractive, comfortable, warm white light, shadowless and without glare. Minimum, incandescent standby lighting with automatic changeover will be provided.

In order to increase the legibility of the destination sign, it too will be equipped with fluorescent tubes with automatic changeover to minimum incandescent standby lighting.

The driver's instrument panel will contain an air gauge and an electric speedometer which is different from ones now in use and which has specifically been designed to run a very long time without attention. Telltale lights of an enunciator system will warn the driver of unsafe operating conditions.

In a convenient location near the



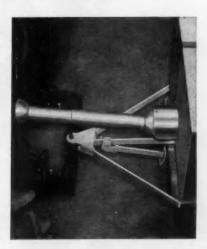


### BLOOD BROTHERS P.T.O. Drive Lines Selected by M&W GEAR CO., Inc. for

### Exciting NEW TRACTOR-TESTING DYNAMOMETER

Tractor repairmen and dealers are enthusiastic about this new test unit because it meets a real need in the farm tractor field. The only machine of its kind on the market, M&W's new dynamometer brings actual field operating conditions into the shop. Mechanics can test the pull power of farm tractors and accurately adjust ignition, carburetion and engine speed under full load for peak performance and economy.

Here's another example of the preference shown by farm implement manufacturers for Blood Brothers Drive Lines. They're selected for almost all new developments and improvements by the progressive Implement Industry because of their field-proven dependability and superiority.



Blood Brothers Safety-Shield Drive Line handles torque loads easily—and protects mechanics working in close quarters around tractor and dynamometer in garage or implement repair shop.

FOR FARM IMPLEMENTS, MORE BLOOD BROTHERS UNIVERSAL JOINTS ARE USED THAN ALL OTHER MAKES COMBINED.



### BLOOD BROTHERS MACHINE DIVISION

ROCKWELL SPRING AND AXLE COMPANY

ALLEGAN, MICHIGAN

UNIVERSAL JOINTS

-AND DRIVE LINE

ASSEMBLIES

# Lubrication with a "sense" of direction



like these, Tuthill service includes the design, development and manufacture of special pumps to fit your individual needs. By taking advantage of Tuthill's custom engineering, you can avoid compromising the design of your product.

Write for Bulletin No. 105 on Tuthill Reversing Pumps or data on other types to fit your specific requirements.

TUTHILL PUMP COMPANY

tion because of its exclusive auto-

matic reversing feature. The

Model R can be driven in either

direction of rotation without

changing the direction of oil flow

or port positions, thus giving re-

versing equipment the most

dependable lubrication protection

In addition to standard pumps

See our Catalog in Sweet's Product Design File—6b-Tu

Dependable Rotary Pumps...

939 East 95th Street, Chicago 19, Illinois

Canadian Affiliate: Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ontario, Canada

driver will be the switch panel containing necessary switches plus controls for the driver's personal heater.

The coach will be equipped with an efficient heating and ventilating system designed to supply an adequate amount of fresh heated air. This system will be automatic in operation and will be one of the major consumers of electric power. All motors will be of high grade construction with sealed ball bearings and will require little attention and no lubrication for long periods of time.

Electric windshield wipers and a front door operator may, although probably will not, be used. Rear doors will be of the push type eliminating the need for electrical safety equipment such as treadles and sensitive edges.

The very heavy electrical load of this coach will be supplied by an engine driven alternator which must be able to carry the major part of the load at idle. This machine will require something other than conventional cooling and will be enclosed to protect it from foreign substances. It will be designed and built to run between engine overhauls without attention or lubrication. It will be controlled by a static voltage regulator which will give very close control and which will go for very long periods of time, perhaps even the life of the coach, without attention.

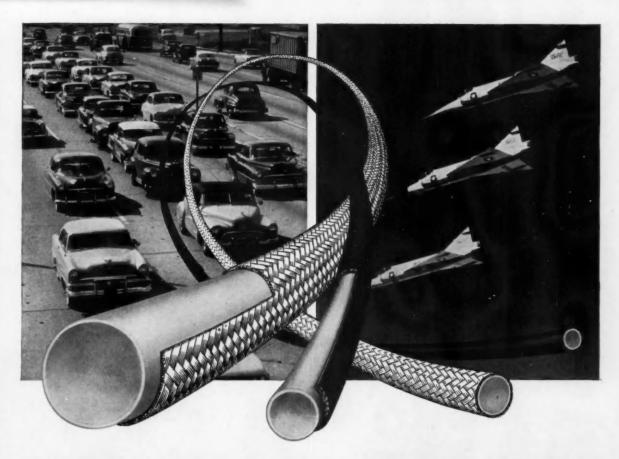
The starting system will be electric, with an improved 12 or 24 volt starting motor. This unit will also be capable of going without attention between engine overhauls. However, its intrinsically long service life can be greatly shortened by operator abuse.

The battery will be of the lead acid type and in spite of the much greater electrical requirements of the coach, will not be larger and may even be smaller than present batteries. Because of generator and regulator characteristics, it should not require as much attention as it does at present.

The many other components of the system will be redesigned to have their reliability and service life extended to match that of the so-called major parts.

The typical intercity coach of the same year, particularly those in long distance express service, will have exterior lighting systems the same as those on the transit coach. Reading lamps will continue to be the incandescent spot type now used. General lights may be of the fluorescent type powered from a 60 cycle inverter which will be required for other equipment. Heating and cooling systems will be improved in detail.

AUTOMOTIVE INDUSTRIES, November 1, 1956



## **BEAT CORROSION AND FATIGUE**

### with the hose that can take it

Wherever hose must really stand the gaff, your best bet is R/M Flexible Thin-Wall "Teflon"\* Hose.

This new hose—stainless steel wire-braided or rubber covered—features extreme flexibility and does not expand, contract or fatigue. It also has great resistance to high temperatures and corrosive lubricants. The braided jacket type meets

MIL-5511 specifications in all designated sizes.

This contribution to better performance and greater safety on the road and in the air is a result of R/M's long experience with "Teflon." Ever since it first came into use, our laboratories have been developing the vast potentialities of this material for all phases of industry. Write for complete information.

\*Du Pont trademark



Other R/M "Teflon" products for the automotive and aviation industries include rods, sheets, tubes and tape; centerless ground rods held to very close tolerances; stress-relieved molded rods and tubes; Rayion—a mechanical grade of "Teflon" with many of the characteristics and properties of virgin "Teflon." For details, call or write R/M.



### RAYBESTOS-MANHATTAN, INC.

PLASTIC PRODUCTS DIVISION, MANHEIM, PA.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Engineered Plastic, Industrial Rubber and Sintered Metal Products • Packings • Asbestos Textiles • Abrasive and Diamond Wheels
Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Laundry Pads and Covers • Bowling Balls

AUTOMOTIVE INDUSTRIES, November 1, 1956

113

# A NEW PRESS FOR LESS 15 TON—AIR HYDRAULIC

• Durable

Compact

Model C-500. A versatile press with 8½ inch throat. 6 inch stroke, 2 inch adjustment, equalized pressure full length whether feather-touch or full blow. 100



pound air line gets up to 21 tons delivery. Stand or bench installation. Maving parts protected in handsome housing. Adjustable speeds. Hand, foot or automatic controls. Simple, tireless and safe operation. Women like it. Long, trouble-free service. Easy to maintain and repair. For all kinds of materials. Thickness no problem. Rivets, flanges, broaches, stakes, crimps. Many other uses.

WRITE TODAY FOR INFORMATION REGARDING APPLICATION TO YOUR 100: ... AND NOW LITTLE IT WILL COST YOU.





HERE'S YOUR ANSWER, if accuracy and dependability are important to you. Cushioned stop eases work to position. Locking cylinder stops the table "on the money" and holds it until released by locking dog. Changes in loads, diameters or speeds are no problem either, since both speed and cushion are adjustable. Top plate is 15" in diameter but the rugged mechanism will handle much larger work loads. Table will make up to 100 indexes per minute with a 22" diameter, 200 lb. load.

**OPERATES** on 60-175 lbs. pressure when equipped for air but table is available for either air or hydraulic operation. 4, 6, 8, or 12 stations are standard but others, up to 30, are made to order.

REPRESENTATIVES: SOME TERRITORIES STILL OPEN. WRITE FOR INFORMATION.



204 BELDEN ROAD JACKSON, MICHIGAN

### The Metal Show

(Continued from page 109)

Graph-Air, featuring excellent hardening characteristics at low hardening temperatures (1450 to 1525 F), and machinability, stability and wearability. It was stated to be especially suited for the manufacture of nonuniform dies or parts with varying cross-sections, because it could be heat treated to close dimensional tolerances with little or no distortion.

Prominent among several new developments in the Magnaflux Corp. booth was the completely automatic Magnatest FW-400 inspection unit for non-magnetic rod, wire, tube and bar. The equipment detects seams, overlapping, diameter variations, inclusions, voids, concentrated porosity, metallurgical variations, and splits.

Aeroprojects Inc. showed a new "ultrasonic" spot welder, designated the Sonoweld, for joining metals by means of vibratory energy induced by high frequency sound waves. The welds are made without melting by shaking the molecular structure of the metals, "jolting" them together in a molecular bond. In the process the pieces to be joined are clamped at 180 psi between two welding members, and the vibratory energy is briefly introduced.

In a large exhibit encompassing several items of equipment, Westinghouse Electric Corp. had on view its new silicon rectifier welder. Said to employ a revolutionary principle, the rectifier features durability and high efficiency (98 per cent); the use of hermetically-sealed rectifier units; and easier starting, better arc stability and maximum drive.

The Sheffield Corp. showed for the first time a new portable, lighter-weight, lower-cost model of the Cavitron, an ultrasonic machine tool which precision cuts and machines the hardest of materials, including carbide, ceramics, porcelain and glass, as well as any metal or alloy, according to its maker.

In a varied display of fasteners shown by Tinnerman Products, Inc., was a new front-mounting nut and bolt retainer which eliminates welding and staking operations and permits ready installation where the assembly is not accessible from the rear.

Tocco Div., Ohio Crankshaft Co., in a colorful display of induction heaters, featured an automated induction heater which was set up to hopperfeed heated bars to an upsetter.



### WHAT ARE SCHWEPPE STUDS?

They are double-ended studs made with dual thread-cutting slots at the lower end. Final threads on this end develop a positive frictional interference locking action on entering the hole.

### HOW ARE THEY DRIVEN?

Schweppe Studs can be driven in an inexpensive drilled hole with any power stud driver. In one simple, continuous operation, they cut their own thread, drive, lock and seal.

### WHAT ARE THEIR ADVANTAGES?

The self-tapping feature eliminates tapping time and thread inspection, tap wear and replacement, tap breakage and salvage time. The self-locking action of Schweppe Studs prevents loosening or backing out, even under extreme conditions.

### WHAT ABOUT AUTOMATION ?

Since Schweppe Studs may be located accurately from the slotted end, they can be "hopperized" for automatic feeding and driving.

To fit many applications, Pheoll Schweppe Studs can be furnished in a broad range of metals, finishes, sizes and thread styles. Learn how you can profit ... find out about the many advantages ...

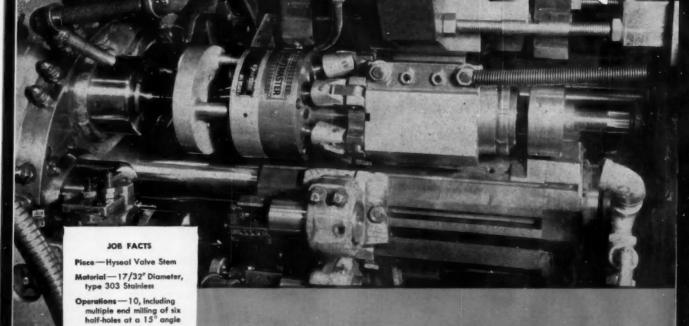
Write for free Bulletin 1056



114

AUTOMOTIVE INDUSTRIES, November 1, 1956

# Home-Gridley



you get CLOSER TOLERANCES with more operations in a single setup



Machine Time — 12 seconds Machine — 1-1/4" RA-6 Acme-Gridley Bar

> Schalble Single-Lever Kitchen Mixing Foucet left you refect both the temperature and amount of water you need with one simple motion—the boon to modern living.

Following exhaustive study of other methods, the Schaible Company found that the only method of producing this valve stem to their rigid specifications at a reasonable cost was on a six-spindle Acme-Gridley bar automatic. Ten operations (including multiple end milling of six half-holes on a 15° angle) were performed in a single setup in 12 seconds machine time. Specifications required a 20 microinch finish to avoid wear on nonferrous components and working to limits of .002" t. i. r. between seating surface and end of valve stem.

BULLETIN TP-44 shows tooling setups on 44 different bar jobs. Write today for your free copy and learn how both greater accuracy and reduced costs can be yours on an Acme-Gridley.

## National Acme

THE NATIONAL ACME COMPANY, 173 E. 131ST ST., CLEVELAND 8, OHIO . Sales Offices: Newerk 2, N.J., Chicago 8, NI., Detroit 27, Mich.

# Cut your metal parts costs... with <u>EASY-FLO</u> brazed design

Thousands of metal parts, originally cast, forged, machined from the solid or assembled by threading or other means, are made today of stampings joined with the low-temperature silver brazing alloy — EASY-FLO.

Considerably lower cost

— is only one reason for the wide and growing swing to EASY-FLO brazed design. Other decisive reasons are...the great strength and indestructibility of EASY-FLO brazed assemblies...the wider latitude in design this construction permits.

Here's a typical example It's the handle of a well-known line of steel lockers. It used to be drop forged. About two years ago it was redesigned for EASY-FLO brazed construction. The manufacturer says the new design is "substantially cheaper and stronger."





Parts are assembled with two U-shaped pieces of EASY-FLO wire preplaced as shown above (arrows) then fluxed and placed on turntable machine.



Prepared assemblies are carried through a bank of citygas-air burners and drop into a detergent bath. The set-up with one operator can turn out better than 275 handles an hour.

Every Industrial Designer should know...

why EASY-FLO brazed construction is so strong, versatile and economical. Bulletin 20 gives full details. Write for a copy today.



Your NO.

Source of Supply and Authority on Silver Brazing Alloys



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TOPONTO, CANADA
MONTEGAL, CAMADA

### **Torque Flite Transmissions**

(Continued from page 51)

devices, etc. Control is so designed that if a given section is fully loaded, the operation of preceding stations will be stopped. Every section of the machine line that handles drilling is provided with automatic gaging stations for probing the depth of blind holes for tapping or limited depth holes. Any of these gaging stations can stop the machine if hole depth is not correct.

Before the case is directed to the machine line, it is annealed in a long furnace nearby, then given a chemical cleaning treatment in a large Kolene unit alongside the annealing furnace. Automatic handling begins at the very start of operations. As castings come in from the foundry, they are delivered to the head of the line, picked up automatically by the conveyor, and routed through the furnace and Kolene unit. It takes nine hours to complete this part of the cycle.

First operation on the transfer line is the rough- and semi-finish-milling of a face; and drilling, chamfering, and reaming of 30 holes. This is done in a five-head Fitchburg.

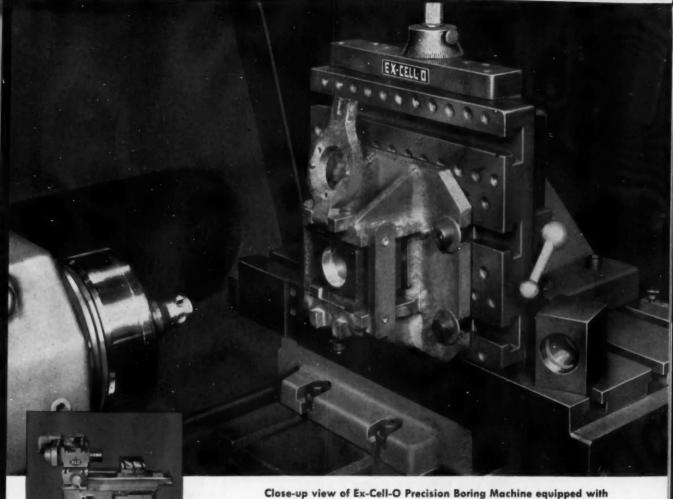
Next in line is a 26-station Fitchburg transfer machine equipped with three milling heads, eight boring heads, and eight drill heads. It handles the following operations: roughand semi-finished-bore the main bearing bores; drill, chamfer, and ream 37 holes; mill pan rail.

A 17-station W. F. & John Barnes transfer machine handles a variety of milling operations, and also drills, chamfers, reams and taps 19 holes in both ends. It is equipped with six drilling heads and two milling heads.

Next follows a group of special Ex-Cell-O precision-boring machines. The first two, equipped with two spindles, semi-finish-bore the bores at both ends. Then comes a battery of four similar machines for finish-boring the same bores. Finally, there is a group of five E-Cell-O special machines for finish-facing both ends to length. The latter, of vertical type, are provided with four spindles, handle four cases at a time. Loading and unloading of this group is fully automatic.

Rough- and semi-finish-boring of servo piston bores is done in a 17head, 26-station Fitchburg transfer machine.

Next is a group of three Barnesdril transfer machines blended into a continuous cycle. The first of these is a 20-station, 11-head unit, which bores, drills, reams, chamfers, and taps 46



Close-up view of Ex-Cell-O Precision Boring Machine equipped with a single spindle and a universal fixture for small lot production.

### These versatile machines keep busy

### Ideal machines for toolroom work and short production runs

These Ex-Cell-O Precision Boring Machines equipped for general-purpose work perform precision boring, turning, facing and chamfering operations quickly and economically.

They can be operated automatically or manually. Spindle speeds are easily changed to suit the operation. Universal fixture rigidly holds tools and work pieces of many sizes and shapes. Horizontal and vertical slides of the fixture permit precision positioning of either tools or work.

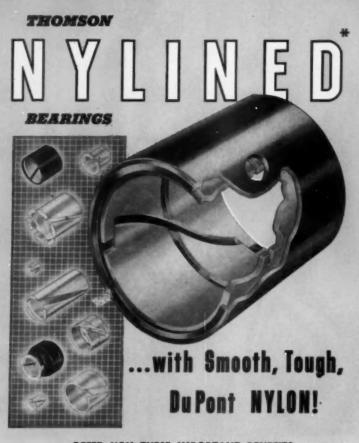
A complete line of precision boring machines is available. For information just call your Ex-Cell-O representative or write Ex-Cell-O in Detroit.

EX-CELL-O FOR PRECISION XLD

DETROIT 32, MICHIGAM MANUFACTURERS OF PRECISION MACHINE TOOLS . GRINDING SPINDLES . CUTTING TOOLS RAILROAD PINS AND BUSHINGS - DRILL JIG BUSHINGS - AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS - DAIRY EQUIPMENT

1212-B double-end

Ex-Cell-O Precision



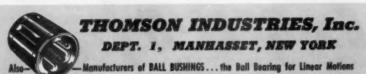
### ... OFFER YOU THESE IMPORTANT BENEFITS

- LOWER COST
- . NO LUBRICATION
- . MINIMUM SPACE
- · CLOSE FIT
- . RESIST POUNDOUT
- . RESIST ABRASION
- . RESIST CORROSION
- . EASILY INSTALLED
- . DAMP VIBRATION
- . OPERATE IN LIQUIDS
- . NO FRICTION OXIDATION
- . LOW FRICTION . SILENT
- . LIGHTEST WEIGHT
- . NON-CONTAMINATING
- . LESS MAINTENANCE
- . SELF-RETAINING
- INSTANTLY REPLACEABLE
- . LONGER LIFE

### Engineered to Solve Problems...Improve Products... Reduce Costs!

NYLINED Bearings are a highly engineered thin liner of Dupont Nylon, designed to bring bearing users the many benefits of Nylon as a bearing material by solving most of the limitations surrounding its use. The compensation gap principle assures maintenance of diametral tolerances for precision applications.

Available in 6 standard types, 10 standard sizes ... from stock. Other types and sizes may be inexpensively tooled for production applications. For catalog containing data on advantages, applications, standard sizes, prices, special types, load ratings, engineering information, evaluation chart, installation methods ... write to



holes. The second unit has 28 stations and is fitted with 21 heads, which drill, ream, chamfer, and tap 36 holes. The third Barnesdril unit has 26 stations and 25 heads for drilling, chamfering, and tapping 38 holes.

These are followed by another group of Ex-Cell-O precision-boring machines. Each one handles two cases at a time. The first two machines semifinish-bore servo bores; the second two finish-bore the same bores.

This completes the major machining stages on the case. The work now is shifted to large Besly-Bowen surface grinders in which the panrail face is ground to a surface finish of 40-microinch. Incidentally, these grinders are provided with two tables—one for grinding, the other for loading.

The case now proceeds through the large, 23-station Centri-Spray washer and then goes through shell-blasting to remove burrs.

Final operation is in the 14-station Apex machine, which is arranged to flush all holes, rinse, assemble plugs, and test for leaks—all in one continuous, automatic cycle.

It may be well to emphasize that the progress of the case from the start of the line to final operations is continuous and automatic. This 600-ft line is the nearest thing to a single automatic machine that one can find anywhere in the industry.

The next installment, dealing with a variety of individual parts for Chrysler's new automatic TorqueFlite transmission, will appear in an early issue of AUTOMOTIVE INDUSTRIES.

### AUTOMATION News Report

(Continued from page 94)

But the exhibit that attracted the most attention was the full-scale model of the earth satellite which is scheduled to be launched into space sometime next year. The model, a 21 - lb globe, contained such instruments as a tiny 13-oz radio transmitter, with a range of 4000 miles, for use in tracking the satellite; miniature pressure, erosion, and temperature gages to maintain a constant check on the satellite's condition; a meteorite collision microphone which will transmit data on collisions at given intervals; and Lyman - Alpha storage equipment for measuring the ionization produced by far ultra-violet solar flare radiations.



The instrument panel of this modern car is RIGID-tex Metal, curved to follow the contour of the wrap-around windshield. As shown in the full-size pattern reproduction above, the RIGID-tex Metal is perforated. This permits any portion of the instrument panel to be used for the speaker grille. It has excellent tone and volume transmission properties because it does not accumulate sound deadening dust. The pattern upsets the perforations, providing better sound dispersion,

RIGID-tex Metal is ideal for instrument panels. Its beautiful, textured, mar-resistant surface breaks up reflected light into small geometric patterns which are eye-pleasing in contrast to the blinding glare reflected from flat metal.

And now RIGID-tex offers both texture and color, in one easily fabricated metal. The added scintillating beauty these patterns attain with the magic of color must be seen to be appreciated. The sparkling highlights, the richness of colored shadows, paints a picture in metal that varies with the light by which it is viewed. Now at long last RIGID-tex Metal makes it possible to bring enduring color to the instrument panel and other sheet metal parts to match interior décor of modern cars, with beauty and texture that catches the eye and sets the buying mood.

RIGID-tex Metal is available in any metal...any finish...any color, solid or perforated. There are more than 40 standard patterns from which to choose and new patterns are constantly being developed.



See Sweet's Design File 1a/Ri or write us for information.

RIGIDIZED METALS CORPORATION
67111 OHIO STREET, BUFFALO 2, NEW YORK

SALES REPRESENTATIVES IN PRINCIPAL CITIES

AUTOMOTIVE INDUSTRIES, November 1, 1956

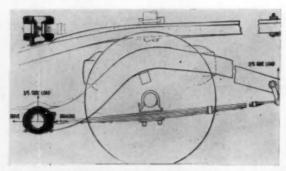
### **New Design Features of Mercury**

(Continued from page 63)

Camshaft drive is by means of a silent chain, driven by a steel sprocket on the crankshaft and a cast iron sprocket on the camshaft.

Solid steel mushroom type tappets are used on the 312-cu in. engine while hydraulic valve lifters are standard on the 368-cu in engine. Solid steel push rods and pearlitic malleable iron rocker arms are employed.

Engine and transmission options for the line are related specifically as follows: the 312-cu in. engine is standard on the Monterey series and Commuter station wagon, with manual shift transmission; Merc-O-Matic and overdrive



Air cushion ride rear suspension



CHAIN CONVEYOR: It carries blanks, from the blanking press, to the stacker.

AUTOMATIC STACKER: Its cycle is controlled by the height of the stack. Gates are air operated and actuated by limit switches. A springloaded cam on the center shuttle bar, when actuated, permits a pusher dog to go into operation—pushing the stack, from the stacker, to the storage shuttle. During the unloading operation, new blanks entering the stacker, are held in preload position by retractable fingers. It's fully automatic!

STORAGE SHUTTLE: It's a storage space for the stacks, while they await their turn to be fed automatically to the secondary presses. And it's operated by a motor and a reducer, mounted beside the shuttle bar. It can be built to any desired length.

**THE OUTSTANDING FEATURE:** The chain conveyor, and the storage shuttle, are separately operated. Therefore, downtime on one press never interferes with the production on the other presses.

MPE

### MICHIGAN PRODUCTION ENGINEERING CO.

Engineering and Manufacturing
1796 E. 9 Mile Road • Hazel Park, Michigan

are available at extra cost. The 312-cu in engine equipped with the new power boost fan is standard on the Montclair series, and on the Voyager and Colony Park station wagons together with Merc-O-Matic drive. Neither overdrive nor conventional transmission are available on these models. The 368-cu in engine is available at extra cost in Monterey, Montclair, and station wagon series, but only when specified with Merc-O-Matic.

The new power boost fan is installed as standard equipment on the 312-cu in. engine only when used in conjunction with Merc-O-Matic and only on the Montclair series, and the Voyager and Colony Park station wagons. The power boost fan will not be available on 312-cu in. engines for the other series, regardless of transmission options; and is not available on the 368-cu in. engine.

The Schwitzer power boost fan incorporates a hydraulic coupling element made extremely compact through use of silicone fluid, and it is controlled thermostatically. Regardless of operating conditions the fan will not run in excess of 2600 rpm. Its principal advantages are: inherently lower power requirements; less fan noise; and restricted fan operation when the temperature of the cooling system is normal or low. This means that much of the time the power required for fan operation will be markedly reduced.

Automatic keyboard control is supplied with the automatic transmission. Mounted on the instrument panel within easy reach, it is of mechanical push-pull cable type. Its operation is as follows: Neutral/Start (N/S), for starting, automatically cancels any previous setting when it is engaged; Drive (D); Low (L); Reverse (R), now protected by an inhibitor feature which prevents engagement of reverse above 10 mph. A park bar, located beneath the housing face, is marked "Park" at the center, "Off Pull" at the left, "On Push" at the right. In

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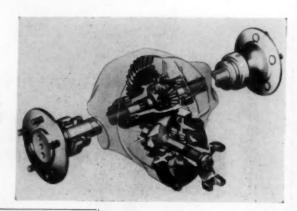
ing and Distributing Co., Inc. on Boulevard . Culver City, California

addition, the control has a special brake release in the form of a vertical bar on the right hand side. The emergency foot brake is released by depressing this bar.

All models have a 20-gal fuel tank, fitted with a cartridge type woven plastic fuel filter, except on station wagons. The latter has a flat type woven plastic filter. Both filters are said to have excellent water separation and dirt removing characteristics.

A noteworthy body feature is the latching of the hood at the front, with

Differential carrier and drive pinion arrangement used on the new cars



### Hardened and Ground Parts are our Specialty

This king pin is truly king-size: 8 long and weighs about 12 lbs. We machined it out of No. 3140-2%" bar steel. After heat treating, bearing surface was given the specified fine finish-grind to 2½" dia., +.000 -.001.

Parts like this are our specialty—we've been making them exclusively for the automobile industry for more than 40 years. Each year has added to our knowledge and skill in precise machining, scientifically - controlled heat treating and micro-finish grinding. Let us show you what we can do with one of your tough jobs. Write or wire.

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Experienced production on:

King Pins • Wheel Studs
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up to 4/4" diameter.



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a positive instrument panel lock control. The hood lifts from the cowl at an extremely wide angle, providing an unusual degree of opening for maintenance operations.

Visibility has been improved by increasing glass area and adding more wrap-around in the windshield. On sedan models the concealed pillar and door construction permits a reduction in the center pillar blind spot area. Two-piece doors with additional structural strength have a hardtop appearance. Exceptionally effective thermal and acoustical insulation is said to result from the use of the new "rotary" Fiberglas insulation at many points.

Air intake openings at the top of the cowl are a new feature, said to improve dust-free air distribution. Interior door lock controls have a horizontal actuating mechanism with a telltale device for "lock" and "unlock." Redesigned safety door locks are stronger and quieter.

As in the past, Mercury has provided many safety features, including safety door locks and steering wheel; padded sun visors; front seat track stop; double socket rear view mirror; instrument panel padding; seat belts; and children's safety jacket.

A new fresh air heater and defroster system takes in outside air. An optional feature is the front end mounted air conditioner and heater combination system, with a single lever and blower speed switch control. The compressor, of two-cylinder type, is installed on the right hand side of the engine, and is driven by two belts. Compressor drive is controlled by a magnetic clutch which is engaged or disengaged through the action of a temperature-controlled electric switch in the evaporator core.

The Mercury line at the time of announcement will consist of the following models, in three series: Monterey Series: two-door sedan; fourdoor sedan; Phaeton sedan; Phaeton



The FRAM Institute of Advanced Filter Research and Design at Dexter, Michigan, is the leading research center of its kind in the world. Here, FRAM scientists and engineers are engaged in the continual study of new filtration methods and materials . . . testing new filter systems in the giant FRAM Dust Tunnel and in actual test car operations.

Fram engineers work closely with automotive manufacturers in designing and developing special filter systems to exact specifications and requirements. The facilities and personnel of the Fram Institute are at your disposal if you have a filtration problem—whether oil, air, fuel or water. For information, write, wire or phone the address below.

### **Test Results Prove Filter Value**

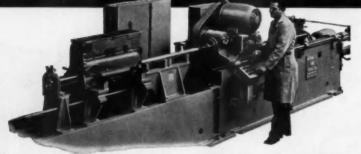
After test runs as long as 40 hours, each engine is completely disassembled and each part carefully weighed and studied for resultant wear.

### Tests Lead to Improved Designs

At the drawing board, the test findings shape new and improved filter designs. Research, testing and design is a never-ending project at the Fram Institute. Fram Corporation Providence 16, R.I. Fram Canada Ltd. Stratford, Ont.



# WHY CUMMINS main bearings are MICROHONED

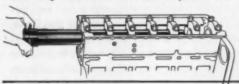


"Cummins diesel engines have a world-wide reputation for dependable, low-cost power. Here at Cummins, we attribute the wide acceptance of our engines to constant searching for better processing methods and improved engine performance.

"For example, if our crankshaft main bearings were undercut at the ends, tapered or out-of-round, then the full load of the journals would be borne by relatively small areas. This would cause bearing inserts to overheat and quickly break down. Also, should the bearings be misaligned, the crankshaft would flex during rotation and cause fatigue failure.

"However, by Microhoning our main bearings we secure round, accurately-sized and aligned bores. Cummins is the first diesel manufacturer to Microhone its main bearings. The surfaces of Microhoned bearings are clean-cut, free of deformed metal and the finish is consistent in every bore. In addition, the consistent accuracy generated by Microhoning permits us to make faster set-ups and use higher cutting feeds on preceding boring operations—Microhoning automatically corrects all inaccuracies.

"After Microhoning, all main bearing bores are checked with a gage plug 44 inches long and .0007 inch under required bore size. Gage must have a simul-



taneous slip-fit through all bores in the block. Tolerance for roundness is less than .0002 inch and finish is held to the specified 55 microinches."

Learn	how	Microh	noning	will	give	you	effici	ent	stock	removal,
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### MICROMATIC HONE CORP.

100 SCHOOLCRAFT AVENUE . DETROIT 38, MICHIGAN

coupe; two-door convertible Phaeton. Montclair Series: four-door sedan; Phaeton coupe; and two-door convertible Phaeton. Station Wagon Series: Commuter Models (comparable to Monterey): two-door 6-pass.; four-door 9-pass. Voyager Models (comparable to Montclair): two-door 6-pass.; four-door 9-pass. Colony Park Model, a four-door 9-pass. deluxe, comparable to Montclair with simulated wood trim.

### **New Pontiac**

(Continued from page 61)

control switch and a larger, coil spring clutch for use with the Synchromesh transmission.

Pontiac's Strato-Flight Hydra-Matic transmission, improved to match the increased torque of the new engines, features a new internal driving mechanism which is said to give smoother, quieter and more responsive performance. The transmission oil cooler is located in the lower part of the radiator.

Fourteen inch wheels are standard. Body styling of the 1957 line features a wide, low front end, with heavy wrap-around bumpers and integrated bomb-type bumper guards. Large oval parking lamps are set into the lower part of the bumpers.

Greater vision is achieved by increasing the windshield area 75.4 sq in. in the Catalinas, convertibles and custom station wagons, and by 69 sq in. in sedans and other station wagons.

The flair of the rear fender fin houses an integrated tail and back-up lamp and a safety reflector. The rear projection of the oval tail lamp is protected by a projection in the rear bumper, which also serves as an exhaust port on cars equipped with dual exhausts.

A missile outline trim of stainless steel sweeps the entire length of the car on each side. The Star Flight styling of the 1957 Pontiac is further accentuated by a windsplit molding in the rear fender. On the Star Chief models, this torpedo-shaped windsplit is sheathed in stainless steel. The same material, brushed to a satin finish, is used on the vaned wheel discs. A full range of modern colors is available on the 16 body styles.

AUTOMOTIVE INDUSTRIES
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### Studebaker Truck Line

(Continued from page 98)

factory-installed 9-ft through 14-ft stake and platform bodies. The 195in. wheelbase is new. It is designed to accommodate 16 to 18-ft vans, stakes or special bodies.

In the new heavier-duty line there will be four chassis and cab models. Three of them will be platform-stake types in 9, 12 and 14-ft lengths. Wheelbases are 131, 155, 171 and 195 in.; gross vehicle weights, 18,000-19,000 lb. These are the largest trucks ever made by Studebaker. Standard engine will be the 289-cu in. V-8, used with a four-speed heavy duty, synchromesh transmission.

Heavy-duty front axles with a carrying capacity of 5000 lb and rear axles with a carrying capacity of 15,000 lb will be used with these new units. A 6.8:1 rear axle ratio is standard and a 6.2:1 ratio is optional at no extra cost. Two-speed rear axles with electric shift will also be available.

A special "premium engine package," which includes many of the standard heavy-duty features of the big 289-cu in. engine, is available with the 245-cu in. six-cylinder engine or the 259-cu in. V-8. The package includes heavy-duty inlet and exhaust valves, heavy-duty exhaust valve springs, and rotary cap kit, chrome-plated top compression piston rings and, on the 259-cu in. engine, heavy-duty aluminum timing gear, heavy-duty connecting rod bearings and crankshaft bearings, and a one-quart oil bath air cleaner.

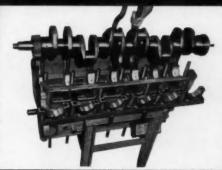
Chassis advances in the Transtar line include new shorter frames with a 102-in. bumper-to-back-of-cab di-With the two-ton heavy duty model, this permits accommodation of a 35-ft round-nose trailer within a 45-ft overall length limit. Power brakes, which have been available on only the 11/2 and 2-ton models, are now provided in all weight classifications. The booster is a 6% in. Hydrovac. Linkage type power steering is available for the first time in the line, and will be optional with all V-8 powered trucks in the one-ton and over classifications.

A non-slip differential, pioneered last year by Studebaker-Packard, will be optional equipment on the half-ton models.

> AUTOMOTIVE INDUSTRIES KEEPS YOU INFORMED

# HOW MICROHONING generates round, accurate, aligned bearing bores

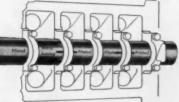
All types of cylindrical surfaces, including small diameters and combinations of soft and hard metals . . . interrupted by keyways, undercuts, ports, reliefs or cross holes . . . can be economically Microhoned to precision tolerances and alignment.



A typical example of Microhoning interrupted cylindrical surfaces is the Cummins Diesel Engine application. Here's how Microhoning generates accuracy and alignment in the crankshaft main bearing bores:



- Cutting pressure is applied radially from the center of the Microhoning tool body. Abrasives and guides both are expanded by the same feed force, and wear at the same rate.
- 2. Abrading action is divorced from the effects of spindle or driveshaft vibration and misalignment by a universal joint that is between tool body and driveshaft.
- The single bank of abrasives travels through all bores on every stroke. As abrasives are Microhoning one bore, the tool is piloted by the plastic guides in the other bores.



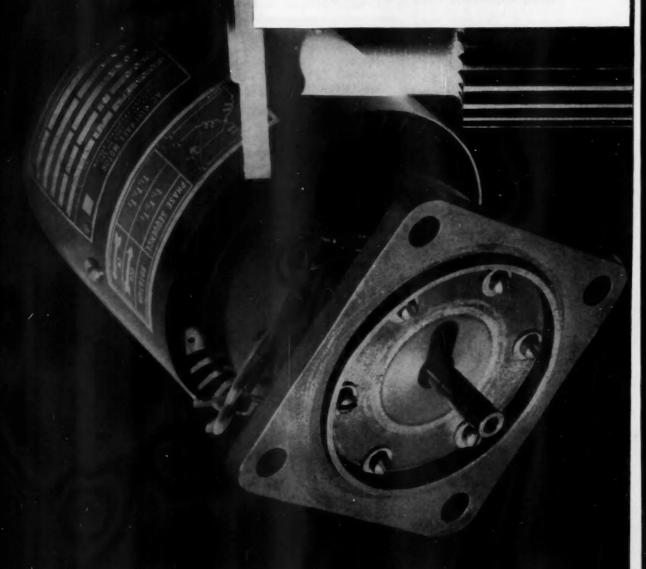
The principles and applications of Microhoning are thoroughly explained in a 16mm, 30-minute sound movie, "Progress in Precision". We'll be glad to

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Please send me "Progress in Precision' showing on	(date).		
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MICROMATIC HONE CORP.
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NOW...an a-c motor that runs "cool," retains output at extreme altitudes



Drive power you can depend on . . . that's the keynote of the new line of Westinghouse 400-cycle, a-c motors. They deliver from 1/30 hp to 3 hp continuously from sea level to 50,000 feet—and raise performance standards to new highs in reliability and efficiency.

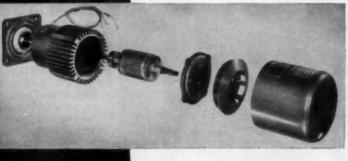
More horsepower than ever before has been packed into extremely small dimensions—like the four-inch diameter frame which delivers 3 hp and weighs under 10½ lbs. In spite of this small size and high rpm, temperature rise is kept exceptionally low by using new cooling techniques giving optimum thermal characteristics to produce the greatest possible horsepower per pound at all altitudes.

These new motors, designed to meet the requirements of specification MIL-M-7969, are totally enclosed, fan cooled and explosion-proof—ready-made for the most hazardous airborne applications. Sparks or flame caused by any abnormality cannot progress outside the motor. A patented method of flame suppression provides this same advantage on larger, open motors, over 3 hp.

### Get More Information . . . NOW!

These new a-c motors—in ratings from 1/30 to 3 hp—are available NOW for direct drive and gear head applications. A drive you can depend on for vital controls and auxiliaries, they meet builder and user specifications with reserve to spare.

And Westinghouse will render full assistance in applying this new motor—the most advanced 400-cycle, a-c drive available today—to help you bring tomorrow's aircraft... One Step Closer. Get complete data and application information from your Westinghouse salesman or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.



The exclusive Westinghouse cooling design is built around an aluminum frame with integral fins. A new, efficient shrouded fan provides high volume cooling air flow. The rotor has extended conductor bars giving far more effective internal air circulation and cooling without added fan weight.

Performance curves for the 3-hp motor highlight the efficiency of these new a-c motors and their ability to handle loads from sea level to 50,000 feet. Greatly simplified and ruggedly designed, they handle even higher intermittent loads for temporary demands, especially at altitude.

Jet Propulsion • Airborne Electronics • Aircraft Electrical Systems and Motors • Wind Tunnels to Plastics

Westinghouse



### **Redesigned Oldsmobiles**

(Continued from page 57)

main bearing remains Durex alloy. Aluminum bearings have been selected because of higher-load-carrying ability and improved wear characteristics.

Camshaft column diameter has been increased to 1½-in. and cam shape redesigned for optimum power. Hydraulic valve lifters are larger in diameter for increased durability of cams and lifters. Moreover, the valve lifter has an anti-varnish feature.

Pistons have been redesigned to provide a thicker and stronger head and heavier ring lands. The second compression ring is made 3/32-in. wide, 1/64-in. wider than last year. With these changes piston skirt stiffness has been increased, durability enhanced, and heat rejection improved.

Air cleaner design has been changed to decrease height and reduce restriction, using a single front snorkel opening. The carburetor has a lower choke location, incorporates a choke modifier which automatically leans the choke during the first part of throttle travel. In addition, the carburetor has a larger accelerator pump and calibration modifications.

Frames are heavier and more rigid with side rails widened to accommodate the lower floor and move body mountings closer to the rocker panels.

Front suspension has been redesigned to employ ball joints at the outer pivots and embodies counter-dive characteristics, reducing brake dive by about 60 per cent. Too, the spring base has been widened by two-inches for greater stability on curves.

Rear shock absorbers have been moved outboard, outside the rear springs, to obtain a wider base and are mounted more vertically to obtain better wheel control.

The rear axle also is changed, has a larger housing to accommodate a new differential having a larger diameter ring gear, larger drive gear pinion, higher capacity rear pinion bearings, and rearrangement of bearings.

The drive line has been redesigned completely in keeping with the lower body floor. The propeller shaft is of three-joint construction with the center joint cradled in rubber.

Brake life and resistance to fading have been improved by a new brake drum design. The drum is flared at the outer edge to reach outside the tire for better air cooling. Improved weather sealing then is accomplished by introducing a dished deflector, spotwelded to the backing plate, to seal around the flared section.

The parking brake, too, has been improved by the adoption of a self-equalizing mechanism.

A single exhaust system, standard on the 88, has a larger muffler. The dual exhaust system is standard on the 98 and Super 88, optional on the 88. Resonators have been added in each tail pipe of the dual system. The 14-in. wheels are standard, featuring a solid spider for increased strength, and a 6-in. rim for greater stability. Size 8.50-14 tires are standard in the line; 9.00-14 being specified on convertibles in the 98 and Super 88 series.

The air conditioning system has increased capacity, with center outlets at the base of the windshield. Controls are of vacuum push-button type as on the standard heater. A 35-amp capacity generator is supplied on air conditioned cars.

A new dual-range heater has been introduced with heater capacity in-



design and

E. TEN MILE RD., CENTERLINE, MICHIGAN

manufacturing, inc.

### how to prevent radiator failure

Engine vibration plus shock and distortion—not corrosion—are the principal causes of radiator failure on heavy-duty vehicles.

They attack the radiator's core, tubes and fins, causing costly damage. Expected service life of an inadequately mounted radiator averages three to six months—in extreme cases failure occurs in the first few days.

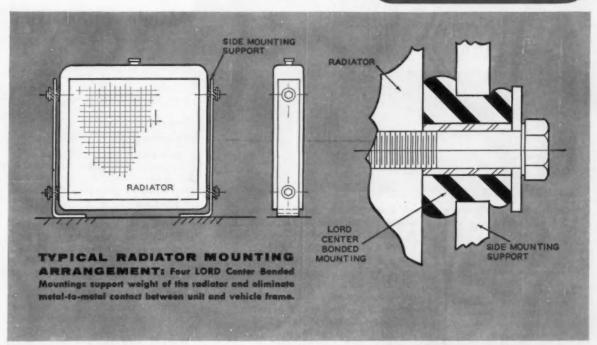
LORD Bonded Rubber Mountings prevent metal fatigue and damage from engine vibration or operational shocks. These rugged mountings are flexible enough to accommodate distortion and twisting—yet rigid enough to provide stability.

Radiator service life can be indefinitely extended by using LORD mountings. Radiators on a widely used type of farm equipment failed in six to ten working hours when inflexibly mounted. Now, with the radiators protected from engine vibration by LORD mountings, no failures have been reported in over 10,000 installations.

The success of LORD radiator mountings is the result of LORD's experience as specialists in engineered vibration control and bonded rubber products. If you have a problem involving vibration, shock or noise, contact a LORD Field Engineer or the Home Office in Erie, Pa., today.

### HERE'S WHERE LORD MOUNTINGS CAN GREATLY INCREASE RADIATOR LIFE

- Tractors
- Power Shovels
- Hay Balers
- Bulldozers
- Scrapers
- Motor Cranes
- · Carry-alls
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AUTOMOTIVE INDUSTRIES. November 1, 1956

129





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Famous S-P cam and lever design holds the work tighter, permits cost cutting heavy feeds and multiple cuts. S-P cam and lever design also resists opening of jaws by centrifugal force or diminishing air pressure . . . an important safety factor. Balanced for high rpm.



S-P SELF-CENTERING CHUCKS are built in Universal American Standard models, sizes 6" - 8" - 10" -12", and Serrated models in 8" - 10" - 12" sizes. Two or three jaws.



S-P COMPENSATING CHUCKS grip out-of-round work with equal pressure on each jaw. Available in 8" - 10" - 12" sizes, two and three jaw models, American Standard or Serrated.

### S-P ROTATING CYLINDERS

Air and Hydraulic

Adequate stroke for long jaw travel of S-P Chucks. Balanced for high rpm on machine tools and other applications. Details in Catalog No. 105 (Air) and Bul. 201 (Hydraulic).

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THE S-P MANUFACTURING CORP.

ESTABLISHED 1916

SOLON, OHIO . IN GREATER CLEVELAND A BASSETT COMPANY

NON-ROTATING AIR AND HYDRAULIC CYLINDERS . ROTATING AIR AND HYDRAULIC CYLINDERS POWER CHUCKS . COLLET AND DRILL PRESS CHUCKS . AIR PISTONS, VALVES, ACCESSORIES

creased by 12 per cent by use of a larger heater core. Capacity is further increased by use of %-in. water lines. Heater controls are more accessible and are illuminated. Control is accomplished through the use of push-buttons with vacuum actuation.

The instrument panel is entirely new. Crash pad treatment on the 98 series is unique, having a crash pad for the top edge and one over the face of the panel below. Another safety feature on all cars is the deepdish steering wheel.

Mention was made earlier of the new bodies this season. One of the major features is a larger windshield with more wraparound and more height, reaching more into the roof

Another noteworthy item is the offering of station wagons in the 88 and Super 88 series for the first time since 1950. These are made in two versions: on Super 88 the four-door body is built without a center pillar; on the 88, it is available with or without the center pillar.

### News of the **MACHINERY INDUSTRIES**

(Continued from page 79)

cent of the inventory and also expects to further reduce the inactive inventory by putting more of the inactive machine tools in use.

### **Brown & Sharpe** Reorganizes

In a far reaching reorganization of its management structure, Brown & Sharpe Manufacturing Co. announced new posts for its senior officials and a large number of new assignments for its plant and field personnel.

Wallace B. Bainton has assumed new duties as vice president and general manager for machine tools, and Wallace E. Anderson is the company's new vice president and general manager for industrial products.

The new appointments were by Henry D. Sharpe, Jr., president of the company, as part of a program to provide greater mobility to the organization and more clearly defined lines of profit responsibility. In the future the company will be organized as two largely independent end-product divisions, to be known as the Machine Tool Division and the Industrial Product Division, each complete with separate engineering, production and field sales organizations.

### 3 GUIDES TO GREATER PROFIT!

... in Your Service Department



VIEW-FINDER" MIRROR provides drivers greater visibility, less glare! A flick of the finger automatically places "View-Finder" Mirror in correct position for day or night driving!



REMOTE CONTROLLED OUTSIDE MIRROR is adjusted from inside the car! Customers like the way Guide's Outside Mirror adds distinction to their cars!



AUTRONIC-EYE "sees" approaching headlights, signals other drivers to dim their bright lights by automatically dimming yours! Autronic-Eye adds safety and value to a car!

Here are three Guide accessories that mean greater safety and convenience for your customers, higher value on their cars—greater profits for you!

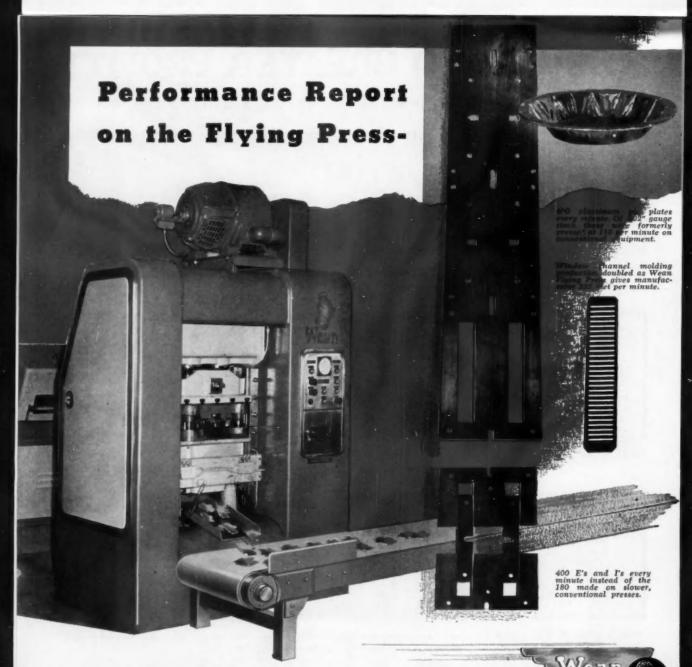
Guide's new "View-Finder" Mirror, Remote Controlled Outside Mirror, and "Autronic-Eye" are products of constant research, and represent more than fifty years' experience in the accessory field.

These Guide products—designed specifically for easy installation—are profitably desirable items in your service department! Guide products spell customer satisfaction. And that spells higher sales, greater profits!

Guide Lamp ... BRIGHTEST NAME IN LIGHTS

GUIDE LAMP DIVISION . GENERAL MOTORS CORPORATION . ANDERSON, INDIANA

Automotive Industries, November 1, 1956



### Revolutionary Wean Press continues to amaze the industry

Since it was first introduced to industry, the Wean Flying Press has commanded the interest of imaginative production people.

On paper, it looked good. Tests on the hand made prototype were even more convincing. But, could a production model achieve such levels under actual operating conditions?

For the answer—note the typical production figures set down here. In every case, the Wean Flying Press, using standard die sets, has established a performance record.

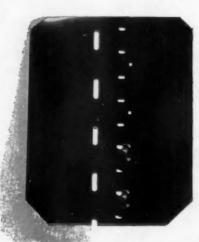
Why not acquaint yourself with this amazing press now? Contact the Wean Sales-Engineer in your area or write direct.

## Wean

### **EQUIPMENT CORPORATION**

CLEVELAND . CHICAGO . DETROIT . NEWARK, N. J.

Coble: WEANCOR



Shallow draw and punch work on .065 gauge stock boosted to 400 pieces per minute by Wean Flying Press.

### **Dodge Trucks**

(Continued from page 96)

An improved 11-in. clutch, formerly an extra equipment item, now is standard on low-tonnage models.

Three-speed auxiliary transmissions are available in all tandem and conventional 700 through 900 models. Overdrive is available in conventional 100 models at extra cost. In addition, two-speed rear axles, making for a wider selection of axle ratios, are available on conventional models 400 through 900, COE's, and school buses.

Vacuum-type power brakes are standard on 500 models and up, optional on 100 through 400 models.

Dodge offers a standard cab on all conventional models 100 through 600: and a custom cab for the same models at extra cost. The latter has many special features, including wraparound rear window, two-speed dual electric windshield wipers, arm rests and sun visors on both sides, Saran and rayon seat covering, latex-treated hair seat back padding and foam rubber seat cushion padding. The Custom cab, without wraparound rear window, is standard equipment on all high-tonnage and COE's; the wraparound rear window is offered as optional equipment on the latter models. Safety door latches of rotary type are standard, as are pull-type door handles.

The new, wide alligator hood with a two-position stop can be opened to a full 90-deg, making the engine compartment more accessible for maintenance and adjustments.

A new multiple circuit breaker light switch puts headlights on a separate circuit from other lights and electrical equipment. Should a short occur in any other circuit, the headlights would still stay on.

### Buick for 1957

(Continued from page 67)

of the weight of the car. Caster and camber are adjusted by shimming between the upper control arm shaft and frame bracket.

Because of the lower floor level the entire drive line has been altered by depressing the torque tube with a downward angle with respect to side rails. As a result it has been necessary to introduce a second universal joint, placed at the rear end of the propeller shaft. The rear axle remains the same, with rear tread of 59 in. on the Series 40 and 60, but reduced to 61 in. on Series 50 and 70. Axle

It's almost THIS easy ... to set up **AUTOMATION GAGING\*** with PRATT & WHITNEY PACKAGE UNITS any number of basic units can be assembled as required

\* Automation Gaging . . . uses a "feed-back" control system to re-set the machine as required to maintain work tolerances AUTOMATICALLY at all times. The results are: increased production, greater accuracy, fewer rejects . . . and greater profits!

AND NOW...an Automation Gaging installation ... custom tailored to your exact needs ... can be assembled quickly and easily from standard, ir.-stock Pratt & Whitney Package Units. The big expense and long delays of specially constructed control equipment are eliminated.

**LEARN HOW** practical the advantages of Automation Gaging can be applied to your production lines. Phone the nearby P&W Branch Office and ask a Pratt & Whitney Gage Specialist to call at your plant... or write direct to West Hartford outlining your requirements.



PRATT & WHITNEY COMPANY

18 Charter Oak Boulevard, West Hartford 1, Connecticut

Branch Offices and Stocks in Principal Cities

MACHINE TOOLS . GAGES . CUTTING TOOLS

HIGH-TEMPERATURE
SERVICE to 500° F —
1000° F — 1500° F

for
RESISTANCE TO
CORROSION by
Acids — Caustics — Salts

for
RESISTANCE TO
ABRASION by wet
or dry grit, silt, etc.

with
NON-MAGNETIC
PROPERTIES, electrical conductance, etc.

with
SPECIAL SHAPES
AND SIZES, low
torque, ultra precision . .

WE MAKE bearings to these and other special requirements, in experimental and production quantities. We've been doing that for years, for well-known firms. So if you need special anti-friction bearings for any application, let's talk it over.

FREE 32-page
Bearings Bulletin tells factors
involved in
special bearing applications — describes our
work in
this field.

May we
send you a copy?

INDUSTRIAL TECTONICS, Inc.

3677 Jackson Road, Ann Arbor, Michigan
5023 E. Washington Bivd.
Los Angeles 22, Calif.

PRECISION BALLS AND
SPECIAL ANTI-FRICTION BEARINGS

ratio is 3.07 to 1 on all Dynaflowequipped cars; 3.58 to 1 with synchromesh on Series 40.

One of the distinctive styling features of the new cars is the zinc diecast radiator grille, composed of 121 vertical bars in two sections.

The air conditioning system has been improved in many respects. Buick uses the same compressor but drives it with a single belt from the water pump pulley. This permits an independent drive, with belt adjustment taken in the compressor mounting brackets.



Total farm assets are about \$134 billion, or an average of \$20,600 per farm worker.

Manufacturing, which employs about 25 per cent of all workers, usually accounts for about 25 per cent of all capital expenditures.

Metal products and processes account for almost 40 per cent of all capital invested in manufacturing in the U. S.

The sharpest rise in investment per worker has taken place in the manufacture of instruments and related products—from \$6100 in 1948 to \$10,267 in 1952.

Total capital expenditures by the automobile industry during the year 1955 were more than seven times as much as during 1939.

Since 1939, the population of the U.S. has increased 29 per cent while civilian employment has increased 37 per cent.

Of the 7,920,186 passenger cars produced in 1955, 39 per cent were four-door sedans, 21 per cent two-door sedans, 21 per cent were two-door hardtops, 6 per cent were four-door hardtops, 10 per cent were station wagons, and 3 per cent were convertibles.



## I'M A TOUGH BUYER

### BUT GARRETT'S GOT IT FOR QUALITY

No sir, you can't beat Garrett when it comes to top quality in small parts. Their "statistical quality control system" means every shipment you get is the finest. But quality is only part of what I like about Garrett. They manufacture and stock the world's most complete line of washers and hose clamps. Boy, when you need any kind of a lock washer, flat washer, spring washer or hose clamp you get it fast . . . most everything right out of stock.

When it comes to stampings and assemblies that's where their high-speed automatic equipment stars. Turns out exactly what you want in no time at all.

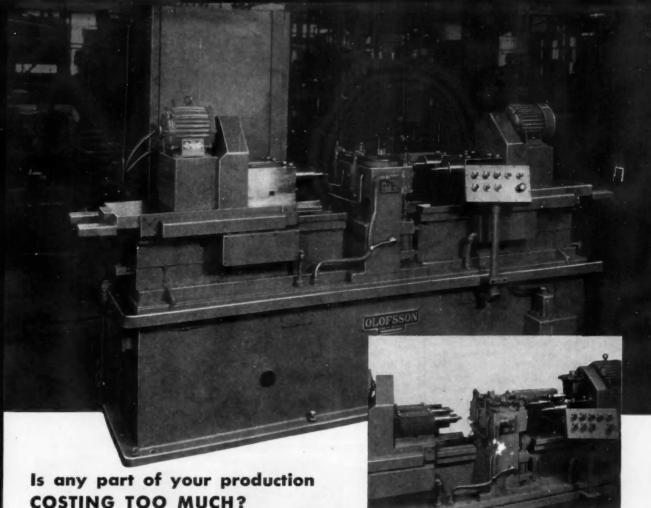
Sure, I'm a tough buyer. I want the best. I want it fast. I want it priced right. And Garrett is the place for me.

> LOCK WASHERS FLAT WASHERS HOSE CLAMPS STAMPINGS

> > Manufactured by

GEORGE K. GARRETT CO., Inc. Philadelphia 34, Pa.





COSTING TOO MUCH?

Today's competitive market demands constantly increasing production per man hour. Any machine tool which can't deliver that kind of production is too costly to operate. That's why an automotive manufacturer recently consulted with Olofsson engineers to increase production and lower unit costs on a boring operation. The result...

TYPE OF MACHINE-Olofsson Two Station Double End Precision Boring Machine arranged with Way Units.

WORK PERFORMED-Finish bore two holes, in line, simultaneously in cast iron differential cases.

RATE OF PRODUCTION - 250 cases per hour.

MACHINE OPERATION — The operator loads the part into the nest and presses the clamp and start cycle button. Both units bore "in" simultaneously and rapid return to unload position. Hydraulically operated finger clamps release the part automatically when both units are in clear position. A manually operated elevator

device is used to help insert and unload part from nest with ease.

Hand cycle provides additional retraction of spindles for setting or removal of cutting tools, also independent control of either unit.

Perhaps you have a tough production problem which can be solved efficiently and economically with Olofsson Special Machinery. You'll find it "pays to specialize with Olofsson".



Put the Olofsson Engineering Department to work for you. Write today. Or phone us at IV anhoe 4-5381, Lansing, Michigan.

OFSSON CORPORATION 2730 Lyons Avenue . Lansing, Michigan

Olofsson Two Station Precision Boring Machine arranged with Way Units. Conforms to J.I.C. electrical and hydraulic standards.

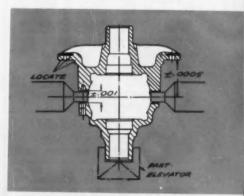


Diagram of differential case clamped into position for simultaneous, double-end precision boring operation.

Manufacturers of Special and Automation Machinery and Precision Boring Machines

### MEN in the NEWS

(Continued from page 40)



Leece-Neville Co.— James D. Barlow has been made purchasing agent.

Brown & Sharpe Mfg. Co., Machine Tool Div.—Wallace B. Bainton has been named vice-president and general manager; Charles M. Evans, manufacturing manager; Harold S. Sizer, director of design for machine tools; Alfred L. Hurst, assistant to the vice-president and general manager; Thomas F. MacLaren, director of field sales; James Meehan, director of milling and grinding machine sales; Alfred P. Sparrow, director of screw machine sales; George F. Patterson, production planning and order service manager.

Pittsburgh Tube Co.—William K. Hahn, Jr., has become president; Harold K. Brooks, senior vice-president and secretary; R. W. B. Hannan, vice-president of sales and a director; H. M. Feely, Jr., vice-president of operations; William C. Kyle, treasurer; and E. Rodney Hornbake, sales manager.

Kaiser Aluminum & Chemical Sales, Inc. — Robert E. Locke was named manager of highway sales.

Aeronca Manufacturing Corp. — Stephen H. Badgett has been named vice-president in charge of operations.

Temco Aircraft Corp.—Eddie Hiler was promoted to assistant manufacturing manager at the Dallas, Tex., plant.

Dana Corp.—G. Leonard Smith is now mid-western representative.

R. K. LeBlond Machine Tool Co.— W. Robert Kohorst is now sales engineer in residence for the West Coast territory.

General Electric Co.—Burton V. Coplan is now Silicon Project supervisor for the Chemical Development Dept.

Are Equipment Corp., Lubricating Equipment Div.—R. E. Sprow has been named manager of automotive sales, and D. G. Reed has moved up to manager of industrial sales.

### **EMPLOYMENT SECTION**

THE Employment Section appears in the first-of-the-month issues of AUTOMOTIVE INDUSTRIES. It reaches the key men whose functions are design, engineering, production, research and development in 3,700 companies producing cars, trucks, buses, aircraft, tractors, engines, parts, agricultural and construction equipment.

The AUTOMOTIVE INDUSTRIES Employment Section offers an excellent source of information for individuals seeking new careers and advancement . . . it offers companies which are seeking engineering, technical and executive personnel an opportunity to reach a wide, interested audience in America's most active industrial field, automotive and aviation manufacturing.

Complete information on advertising rates and sizes are in the column on the right.

#### NET ADVERTISING RATES

		Time	6 Times	12 Times		
	f page	\$330.00	\$310.00	\$290.00		
	2/3 page	235.00	220.00	215.00		
	1/2 (isl.)	220.00	200.00	185.00		
	1/2 (reg.)	200.00	180.00	165.00		
	1/3 page	170.00	150.00	135.00		
	1/4 page	130.00	115.00	110.00		

#### COLOR RATES

A.A.A. STANDARD RED & BLACK, \$60.00 per page, in addition to space rates.

ANY OTHER A.A.A. STANDARD COLOR & BLACK, \$80.00 per page, in addition to space rates. ANY MATCHED COLOR \$100.00 per page, in addition to space rates.

FOR MORE THAN I COLOR IN ADDITION TO BLACK or for 2 COLORS WITHOUT BLACK, special quotations must be furnished.

BLEED PAGES, \$35.00 additional for each page. TERMS: 2% 10 days; 30 days set.

### MECHANICAL REQUIREMENTS:

Full type page, 7 x 10; twe-thirds page,  $4\frac{1}{2}$  x 10; half page, 7 x  $4\frac{1}{6}$ ,  $3\frac{1}{6}$  x 10; one-third page,  $2\frac{1}{6}$  x 10 or  $4\frac{1}{2}$  x  $4\frac{1}{6}$ ; quarter page, 7 x  $2\frac{1}{6}$  or  $3\frac{1}{6}$  x  $4\frac{1}{6}$ .

BLEED CUTS: 8%" x 11½". (Allowing ½" top, bottom and side for trim. Held copy in %" from binding odge). Trim size: 8½" x 11½". Half-tones 100 screen. Electros can be used but not maits or storoctypes. ZINC OR PLASTIC PLATES NOT ACCEPTED. All cuts destroyed one year after last rus.

FINAL CLOSING DATES: 10th of month preceding publication date. For composition or proofs 10 days one-line

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Chestnut & 56th Sts., Phila. 39, Penna.



## Insure your future -

A DRAFTING CAREER IN THE
ATOMIC ENERGY FIELD



AIRCRAFT NUCLEAR PROPULSION DEPARTMENT Here is an opportunity to join an organization that offers unlimited possibilities for job advancement and personal growth. We seek men to design and develop a nuclear reactor for the propulsion of aircraft. There may be a place for you in this dramatic and thrilling achievement! If you're a detailer, designer or a facilities design draftsman, fill out the coupon below and rush it to us at once.

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Dear Mr. Cowan:
I'm interested in full details
about an opportunity at
General Electric as Draftsman. Please send me more
information. I understand
all replies are held in
strictest confidence.

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Check items listed below indicating approximate

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Machine Parts	Other:

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, AGEMENT, AND CIRCULATION OF

AUTOMOTIVE INDUSTRIES, published semimonthly at Philadelphia 39, Pa. for October 1, 1956.

- 1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, John C. Hildreth. Jr., Conestoga Road, Devon, Pa. Editor, James R. Custer, 303 Hampden Road, Upper Darby, Pa. Managing editor, None. Business manager, John C. Hildreth, Jr., Conestoga Road, Devon, Pa.
- 2. The owner is: (if owned by a corporation, its name and address must be stated and
  also immediately thereunder the names and addresses of stockholders owning or holding 1
  per cent or more of total amount of stock. If
  not owned by a corporation, the names and
  addresses of the individual owners must be
  given. If owned by a partnership or other unincorporated firm, its name and address, as well
  as that of each individual member, must be
  given.) Chilton Company, Chestnut and 56th
  Sta., Philadelphia 39, Pa.

Holders of more than 1 per cent of the capital stock outstanding of Chilton Company: Mary M. Acton, 260 Sycamore Avenue, Merion Station, Pa.; Mrs. Beulah Fahrendorf, 59 Drake Road. Scarsdale, New York; Dorothy S. Johnson, 1115 Fifth Avenue, New York, N. Y.; Estate of Mabel M. Musselman, 260 Sycamore Avenue, Merion Station, Pa.; Beneficiaries: Mary M. Acton and David Acton; J. Howard Pew, 1608 Walnut Street, Philadelphia, Pa.; J. N. Pew, Jr., 1608 Walnut Street, Philadelphia, Pa.; Mabel P. Myrin, 1608 Walnut Street, Phila-delphia, Pa.; Mary Ethel Pew, 1608 Walnut Street, Philadelphia, Pa.; Alberta C. Sly, Executrix U/W of Frederick S. Sly, Deceased, 149-40 35th Avenue, Flushing, N. Y.; Beneficiaries; Albert C. Sly, Alberta C. Sly and John E. Sly; Mary M. Acton and John Blair Moffett, Trus tees U/W of Clarence A. Musselman, Deceased, 1608 Walnut Street, Philadelphia, Pa.; ficiaries: Mary M. Acton and David Acton: Charlotte M. Terhune, 160 E. 48th Street, New York, N. Y.; Alberta C. Sly, 149-40 35th Avenue, Flushing, N. Y.

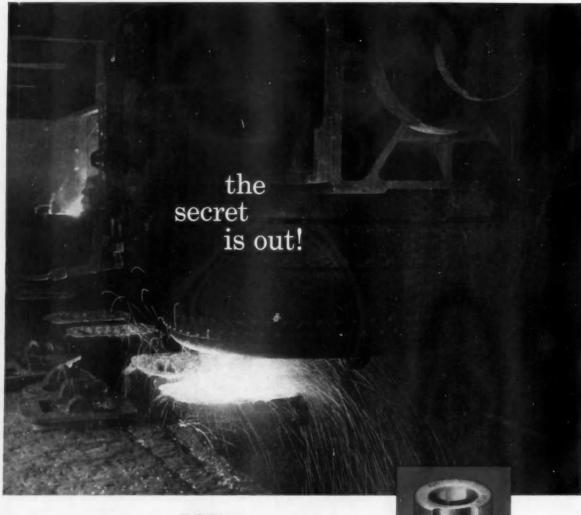
- 3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.
- 4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.
- 5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

JOHN C. HILDRETH, JR. Publisher

Sworn to and subscribed before me this 18th day of September, 1956.

PHILIP J. SHIRE, JR.

(My commission expires January 7, 1959)
[SEAL]



### It's the steel in ACE drill bushings!

TWO YEAR SECRET STEEL FORMULA ASSURES LONGER DRILL BUSHING LIFE...

If you are one of the many ACE drill bushing users who have told us about the extra-long bushing life you have been getting from our drill bushings—we thank you...and now we are going to tell you why!

More than two years ago ACE, without telling anyone and without raising costs, began making shipments of drill bushings made of a special high-carbon chromium bearing steel! With this new oil-hardening steel coupled with an exceptionally high degree of precision in the heat treating process, ACE engi-

neers found that bushing life was increased tremendously. Rather than make an announcement at that time... we hoped that user comments would prove the importance of the new steel—and they certainly have! From all parts of the nation ACE drill bushing users have told us about the much longer life they have been getting... how production costs from both a material and labor standpoint have dropped sharply. Now... the secret is out... it's the steel!

Look to ACE for Quality...Accuracy... Largest Deliverable Stocks Anywhere!

Write TODAY for the all-new 1956 catalog containing technical data, comparison tables, price lists and name of dealer in your area.



ACE DRILL BUSHING CO., INC. 5407 Fountain Ave., Los Angeles 29, Calif.

### THIS is a Metal Cleaning and Rust Proofing Machine

... it is part of a Complete Mahon Self-Housed Finishing System
Installed in 1939 on the Roof of Maytag's Plant No. 1



Conventional Wringer Washer Produced by Maytag in 1939.



Today's Product: The Famous Maytag Wringer Washer Produced Today Receives its Fine, Durable Finish in the Same Finishing Equipment.



Partial View of Maytog's Plant No. 1. The Mahon Solf-Housed Finishing System Installed on the Roof in 1939 is clearly visible. Over a dozen other Mahon Installations—Including Two More Complete Finishing Systems—are today in operation in Maytog Plants.



# ... OVER 5,000,000 MAYTAG Conventional WRINGER WASHERS have PASSED THROUGH THIS FINISHING SYSTEM...and It is STILL in DAILY USE!

When you hear this statement: "Mahon equipment is engineered better and built better for more economical operation over a longer period of time", it is no idle boast. There are dozens of Mahon Finishing Systems in various industries throughout the country with performance records comparable to this one at Maytag. When you make a capital investment in equipment which so directly affects your production costs and the appearance and saleability of your product, your primary concern should be end results—quality of finish produced, operating efficiency, flexibility of equipment to handle future production loads and model changes, and yearly maintenance requirements—these are the all-important considerations. The lowest price tag doesn't tell the whole story . . . so, if you want good finishing equipment—equipment that is thoroughly engineered and coordinated to do a good finishing job, remember that you can only buy Mahon experience, Mahon engineering and Mahon quality equipment from Mahon. It may cost a little more, but Mahon customers will tell you that "It's the best investment you can make". See Sweet's Plant Engineering File for information, or write for Catalog A-657.

THE R. C. MAHON COMPANY - Detroit 34, Michigan SALES-ENGINEERING OFFICES IN DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling and Russ
Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems,
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## MAHON

# New

JOE"

We call it

"LITTLE

# LINDBERG-FISHER Autoladle

Here, for the first time, is a ladling unit that makes automatic casting of aluminum not only possible but practical. The Autoladle has been thoroughly tested and proven in service.

"LITTLE JOE" provides these advantages:

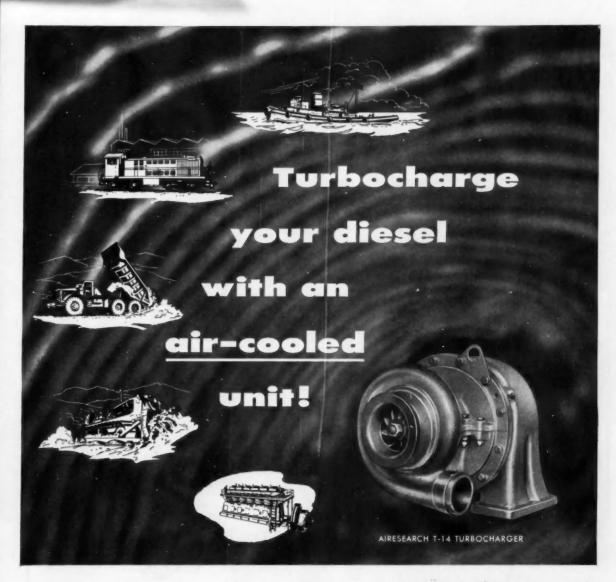
- Adaptable to induction, electric resistance or fuel-fired reverberatory furnaces.
- · Ladled metal is withdrawn from beneath surface of bath.
- Precise, accurate control of any size shot up to 30 lbs.
- · No interruption of the casting cycle during charging of metal.
- · No variation of size of shot due to metal level changes.
- Composed of special refractory materials so arranged that ladled metal cannot come in contact with any metal.

To the best of our knowledge this is the first practical automatic ladling unit yet devised. It will fill an important need in many casting operations. For complete information, get in touch with your nearest Lindberg Field Representative (see your classified phone book) or write direct.

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MELTING FURNACES

A Division of Lindberg Engineering Company, 2491 West Hubbard Street, Chicago 12, III.



AIRESEARCH turbochargers increase power to the full capacity of the engine, yet require no extra plumbing and put no added burden on the cooling system.

The diesel industry generally has recognized the fuel-saving, noise and smoke reducing and power-adding advantages of turbocharging. But there are important differences between turbochargers. Some are difficult to service and add complicated plumbing because of the necessity for water-cooling.

All AiResearch turbochargers, from the smallest units for mobile equipment to the large, stationary power plant models, are air-cooled. Each contains a removable rotating assembly which simplifies maintenance, especially in the

field. Their modern design resulted from the most extensive experience in the field of small turbomachinery in America.

We invite your inquiry on their application to your diesel equipment.

### BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

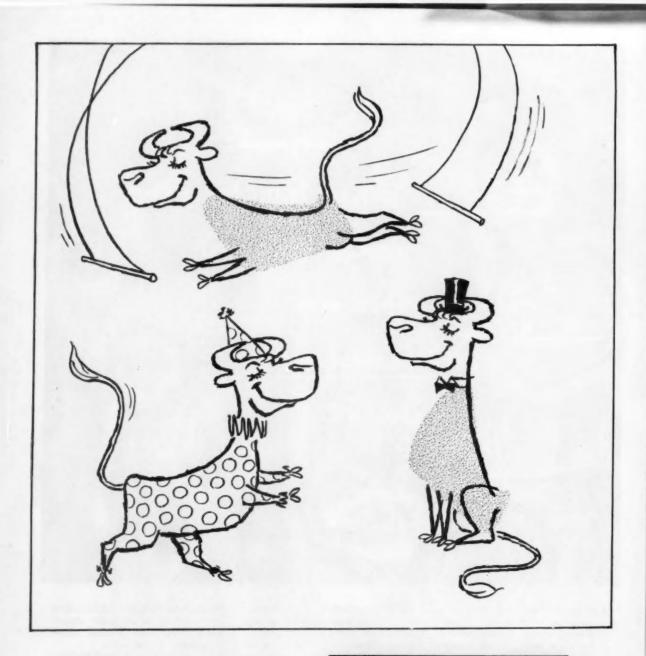
MODEL	T-10	T-14	T-15	T-30-2	T-30-6
Diameter - in, nom.		11.5	15.25	15.25	16
Length - In.		14.12	16.75	17.25	21.75
Weight - Ib.	40	95	125	135	195
Output - Ib/min.	25-40	35-65	35-45	70-95	115-175
(Standard Conditional					

GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS



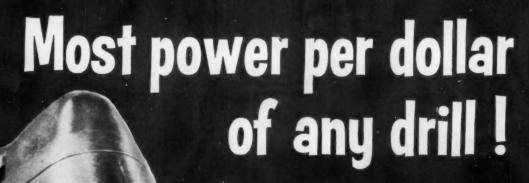
## For versatility...

## Leather

You can recommend genuine leather upholstery with confidence,
no matter what model you are selling. It's practical enough for the family car,
brilliant enough for a sports car. It has the prestige and dignity
needed for a limousine, and the high-fashion that's right in a hardtop. Your customers
get more value, and you make more sales, when you sell genuine leather upholstery.

#### Only genuine leather wears as well as it looks

THE UPHOLSTERY LEATHER GROUP, INC. . Fisher Building, Detroit 2, Mich. . 141 E. 44th St., New York 17, N. Y.



Back by popular demand!

Black & Decker 1/4" Standard

## HOLGUN

(CODE No. 345)

- 1. Lowest-priced drill in its class!
- 2. Wear-resisting ball bearings.
- Compact and lightweight reduces operator fatigue.
- 4. No stalling under heavy loads.
- Belongs to world's best-known drill line.

The new model Black & Decker ¼" Standard Holgun combines lightness and power. It's your ideal tool for a raft of drilling jobs. Powered by a B&D-built motor, it has stamina to spare. Rugged construction gives you years of trouble-free service.

See your B&D distributor today or write: The BLACK & DECKER MFG. Co., Dept. 1611, Towson 4, Md.

Look in the Yellow Pages under "Tools—Electric" for Nearest Distributor.





Drives up to ¼" taps for threading holes in steel, cast iron, brass or aluminum. Automatic reversing mechanism. Lightweight. Easy to handle. The only tool of its type!



Black & Decker

Portable electric tools . . . power-built to last!



## QUALITY CONTROL MAINTAINS EFFECTIVENESS OF ACP PROCESSES

Behind the operation of an ACP process in your plant is an efficient Quality Control organization. Physical tests of production-run panels processed in your equipment are made on such devices as conical mandrels and impact machines to determine the adhesion of the painted finish to the metal treated by the ACP process in use. Other equipment tests weathering qualities, rust and corrosion resistance, abrasion resistance—all are part of the complete ACP customer service.

Ask us for more information about ACP processes for treating aluminum, steel, zinc, brass, copper and other metals, either for protecting the metal or producing a bond for decorative and protective paint finishes.



IMPACT TESTER STRIKES A TELLING BLOW . . . indicales the ability of the painted finish to resist cracking when metal is deformed by a steel ball under a predetermined impact.

## AMERICAN CHEMICAL PAINT COMPANY, Ambier 24, Pa.

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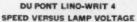


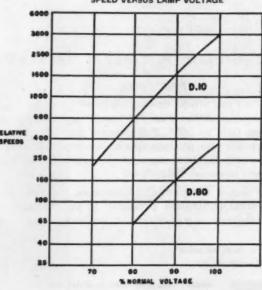


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## LINO-WRIT 4





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## Methods of Carburizing Alloy Steels

Carburizing is a means of impregnating the surface of steel with carbon, usually to very limited depths. Its purpose is to provide a hard, wear-resisting "case," or outer shell. Alloy steels, correctly handled, can be case-hardened without sacrificing desirable core properties.

There are three types of carburizing in general use. These will be discussed briefly in the following paragraphs:

Liquid Carburizing—The medium here is a hot salt bath composed basically of cyanide compounds. The steel is immersed in the bath, the period of immersion depending upon the analysis of the steel and the depth of case desired. Liquid carburizing produces a thin, hard, wear-resisting case with a maximum practical depth range of 0.02 to 0.03 in. When the steel is quenched directly from the bath, distortion is low.

Gas Carburizing—This method employs a furnace in which a carbonaceous atmosphere is created; i.e., gases that are high in carbon components, or those containing carbon. Steel subjected to gas carburizing can be case-hardened to depths generally ranging from 0.01 to 0.04 in. When quenching takes place immediately after carburizing, distortion can be kept to a minimum.

Pack Carburizing—Where the pack method is used, the parts to be

carburized are buried in a container of dry carbonaceous materials. The container is sealed tight to prevent the infiltration of air, placed in a furnace and kept there for eight hours or more, the actual time depending upon the depth of case desired. Pack carburizing is particularly suitable where a deep case is essential (0.06 in. and over), although medium cases in the 0.04-to-0.06-in. range are possible.

The carburizing of alloy steels is a highly technical subject, and Bethlehem metallurgists will be glad to help you with any phase of it. Feel free to consult with them about the results to be expected from various analyses and the various methods of treatment. And when you are in the market for alloy steels of any kind, please bear in mind that Bethlehem Steel makes the complete range of AISI standard grades of alloy steels, as well as special-analysis steels and all carbon grades.

If you would like reprints of this series of advertisements from No. I through No. XVI please write to us, addressing your request to Publications Dept., Bethlehem Steel Company, Bethlehem, Pa. The first 16 subjects in the series are now available in a handy 32-page booklet, and we shall be glad to send you a free copy.

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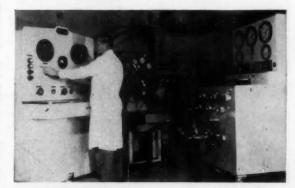
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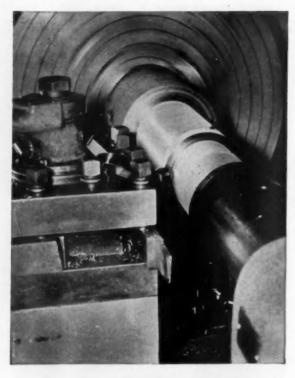


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## WHY IT PAYS TO SPEND FOR CARBOLOY EXTRA-

If you rely on "Equivalent Grade" Charts to save a few tooling pennies, these facts on carbide costs may save you thousands of production dollars



TESTS ON STAINLESS STEEL VANED ROLLS by a New Hampshire pulp and paper-processing equipment manufacturer demonstrate how the "Equivalent Grade" Charts hide tremendous differences in carbides' production abilities. With Grade "X," production per tool was limited to two pieces per grind. Machine speed had to be held down to protect the carbide.

Switching to Grade 370 brought the manufacturer 8 to 9 pieces per grind. Machine speeds were doubled; 14 hours a day in labor were saved. Result: savings of more than \$100 a week, in addition to lower downtime, grinding, and inventory costs.

**S**o-CALLED "Equivalent Grade" Charts hide the fact that no two carbide grades will produce the same results. Because they classify carbides by broad areas of application, the Charts ignore important differences in production ability.

Thus, they mislead buyers into believing they can safely purchase the cheapest grade listed for a job.

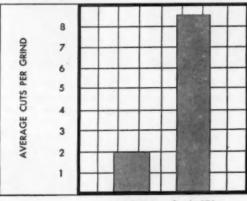
But actual tool-comparison tests have proved conclusively that the production abilities of carbides do vary tremendously. Moreover . . . these tests show that the pennies saved by buying on low initial cost often lead to thousands of wasted dollars . . . in lost production, lower machine efficiency, non-productive man-hours.

The case history at left is one of hundreds demonstrating why cost per finished piece—not initial cost—is the only reliable guide to buying carbides.

#### Results of an actual comparison test

According to the "Equivalent Grade" Charts, any one of several carbide grades could handle the job of machining these rolls. The manufacturer tried Grade "X" first — because it cost 10% less, initially, than Carboloy\* Extra-Performance Grade 370.

Grade "X," however, machined only two rolls per day. Grade 370 increased production to 8 or 9 pieces per day (Graph No. 1).



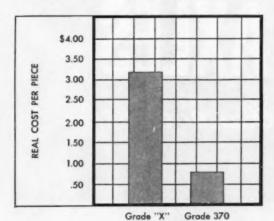
Grade "X" Grade 370

Graph No. 1-Production Ability Comparisons

# A FEW CENTS MORE PERFORMANCE CARBIDES

When the *real* cost of the tools was calculated, the manufacturer found the initial saving with Grade "X" was actually *making* him *lose* more than \$100 a week. Here's why:

The real cost of Grade "X" was \$3.18 per piece machined (2 pieces from a \$6.37 tool). The real cost of Grade 370 is just \$.82 (average of 8½ pieces from a \$7.01 tool). On the weekly production of 42-43 rolls, the saving totals \$100.30!



Graph No. 2-Real Cost Comparisons

Yet even this eye-opening figure does not tell the whole story. The Grade 370 tool operated at twice the speed of Grade "X." It helped save the manufacturer 14 hours a day in labor. It provided twice the tool life. It eliminated a special finishing tool.

When these facts were translated into dollars and cents, the manufacturer found that downtime costs were reduced, because the tool remained on the job longer. Grinding costs were reduced, because the tool required less maintenance. Inventory costs were reduced, because a few tools did the work of many.

When added up, these amounted to a considerable saving - yet nothing in the "Equivalent Grade"

Charts could have forecast it. These are savings which buying on the basis of initial cost always obscures. These are savings which more than justify spending a few cents more for carbides with extra production ability.

## Carboloy Extra-Performance Carbides available for all steel-cutting jobs

Heavy-Duty Grade 370, used in the test above, is one of three Carboloy Extra-Performance Carbides. Together with Medium-Duty Grade 350 and Finishing Grade 330, these grades cover the entire steel-cutting range from roughing to finishing.

Extra-Performance Grades 330, 350, and 370 cost more, initially, because they are made by a unique and more costly process. But their performance so far exceeds conventional carbides that there are actually no "equivalent" grades for any of them. They cannot be fitted into the arbitrarily selected cubbyholes on the "Equivalent Grade" Charts now in common use.

These Extra-Performance Grades easily expose the fallacy of the "Equivalent Grade" Charts, because they are so superior to other steel-cutting grades. But even when attempting to classify conventional grades, the Charts exhibit the same fatal flaw.

Because there is no way of knowing in advance how any grade will perform on the job, we make this suggestion: Always run your own comparison tests before you specify a grade. When the results are in, you will find that one grade will bring your plant significant savings in tool costs, machining and labor expense.

We think you will find that grade will be one of the Carboloy Extra-Performance Carbides. But whatever it is, specify it by name. Do not settle for an "equivalent" grade.

If you would like a more detailed discussion of the whole problem of Initial Costs vs. Real Costs, and the fallacies of the so-called "Equivalent Grade" Charts, write today for a sales engineer to call on you. Send your request to: Metallurgical Products Department of General Electric Company. 11151 E. 8 Mile Road, Detroit 32, Michigan.



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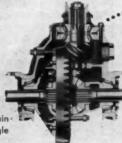
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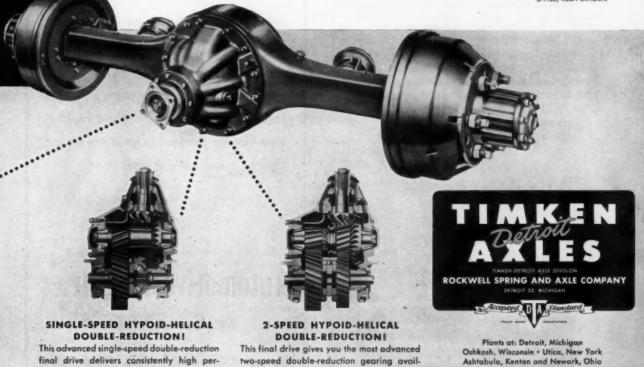
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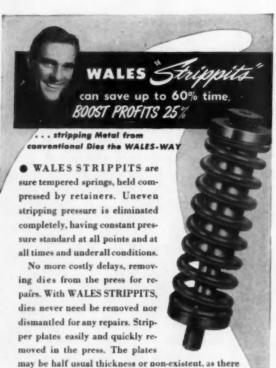
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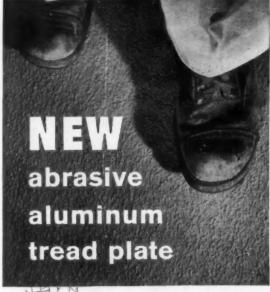
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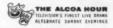
It's so nonskid you can walk right up a 30° incline, even when it's wet, greasy or covered with oil!

This tread plate won't lose its grip. Wearing it down simply exposes more rolled-in grit! It's two-thirds lighter than steel. It comes in many sizes and thicknesses. It's easy to punch, cut, form, weld, shear, etc.

THINK—Where can you use this light, corrosionresistant tread plate? It's ideal for factory floors, ladder treads, train vestibules, plates, truck trailers, marine decking, elevator floors and sills and many other uses. See your Alcoa distributor.

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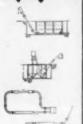
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"Thrift-King" is a 2-way value seat for manufacturers of lift-trucks, mowers, and many types of medium mobile equipment: it definitely adds "sell;" it definitely improves workability. Full cushion foam rubber seat and full cushion foam rubber back rest assure sustained comfort and operational freedom. Wide choice of covering materials that will withstand outdoor use. Frame is of solid onepiece welded construction for rigorous service; easily attached. Available as illustrated, or with special features engineered to your equipment.

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#### AIR OPERATED MODELS IN FOUR SIZES

The heavy duty Big Brother Bender is designed for fabricating bus bars, brackets, fixtures, etc., with-out special tooling. Air controlled with finger tip response. Comes complete with dies, mandrels and with thes, manners and blanking dies extra. Will punch holes up to 1" and form material up to 14" thick by 4" wide. We also build smaller models, hand or air operated, for bending materials up to 1/4"

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# CLEAR-O-MATIC\* The All-Temperature Piston

UNIFORM SKIRT CLEARANCE FROM 20° BELOW ZERO TO 200° F

## STEEL TENSION MEMBER

Anchored only at pin bosses and cast in positive contact with I.D. of piston skirt

Controls Clearance Automatically

## Sensational Performance Requires less than .001 Clearance

Cold or Hot, Clear-O-Matic Piston clearance stays constantly uniform. Required clearance is reduced to less than .001. This great development of the "All-Temperature" Piston by Zollner engineers provides another fine feature attraction for the modern motor car . . . smooth, quiet running engine . . . no cold slap . . . reduced friction without loss of durability or heat conductivity . . . no danger of scuffing or seizing. We suggest a test of these sensational performance advantages for your engine.



Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F

2 Effective expansion identical with ferrous cylinder.

3 Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.

4 Normal diametric clearance usually less than .001 with uniform skirt bearing.

Durability and conductivity comparable to heavy duty design.



UNIFORM

EFFECTIVE SKIRT

CLEARANCE

AT ALL

TEMPERATURES

"T.M. Reg. Pat. App. For

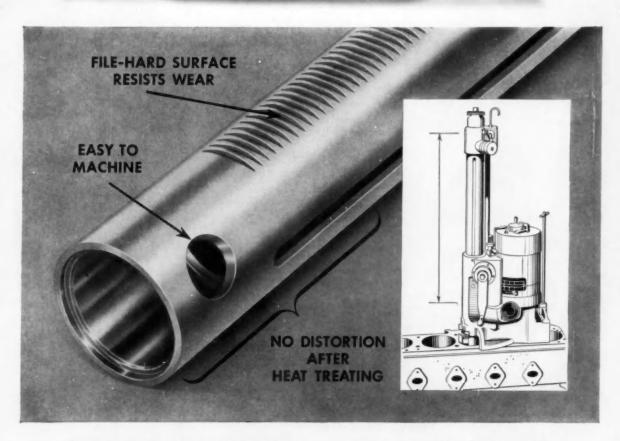
ADVANCED ENGINEERING

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PISTONS

ZOLLNER Fort Wayne, Indiana



## Boring bar maker solves heat-treat distortion problem by switching to TIMKEN® 52100 steel

HEAT-TREATING distortion was running up the manufacturing costs of the boring bars Van Norman Automotive Equipment Company makes for reboring hardsleeve cylinder blocks. The column of the boring bar, which acts as the spindle, had to be extremely straight. Yet many of them were distorting after heat treatment. And that meant putting them through an extra straightening process.

Studying the problem, metallurgists of the Timken Company suggested a switch to Timken® 52100 steel. Since this steel is hard and tough, it had the qualities Van Norman wanted. And because it responds uniformly to heat treatment it proved to be the answer to their production problem.

By switching to Timken 52100 steel, Van Norman eliminated the need for the costly straightening operation. And as a bonus, they've found that Timken 52100 steel is easier to machine than the steel they previously used.

The Timken Company pioneered the development of 52100 and is one of the principal producers of the steel—the only source of the grade in three finished forms: bars, tubing and wire. You can rely on the Timken Company for small run or emergency requirements as well as mill quantities.

We stock 101 sizes of 52100 steel, ranging from 1" to 10½" O.D. For a complete stock list of available sizes, grades and finishes, write The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO".



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